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Skeptical Inquirer

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SPECIAL SECTION

What are the Chances?

Coincidences
Remarkable or Random?

Numerology
Comes the Revolution

Calculated Risks

How to Study Weird Things

Why Would People *Not* Believe Weird Things?

Of Planets & Cognitions
Deductive Inference in Science & Psychology

Starkle, Starkle, Little Twink

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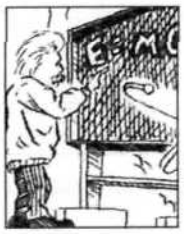

Why Would People *Not* Believe Weird Things?, p. 42

SPECIAL SECTION: WHAT ARE THE CHANCES?

23 **Coincidences: Remarkable or Random?**

Most improbable coincidences likely result from play of random events. The very nature of randomness assures that combing random data will yield some pattern.

BRUCE MARTIN

29 **Numerology: Comes the Revolution**

Strange things can happen by coincidence. Strange things must *happen by coincidence. Fifty-sevens in the American Revolution provide an example.*

UNDERWOOD DUDLEY

32 **Calculated Risks**

We are notoriously bad at assessing risk. Cultural context and human psychology come into play at least as much as statistical realities. For instance, our perceptual apparatus is geared towards exotic, personal, dramatic threats. This doesn't mean we're ignorant; just human.

K. C. COLE

ARTICLES

37 **How to Study Weird Things**

Many students are asking to study unconventional topics. There are strategies for working with these students that increase their critical aptitude and analytical reasoning without disenchanting them with science and traditional disciplines.

FRANK TROCCO

42 **Why Would People *Not* Believe Weird Things?**

Instead of being appalled at the gullibility of the general public, perhaps we should be surprised that they believe so few *strange things. Compared to widely held religious beliefs and the even more astounding notions of physics, things like ESP, UFOs, and astrology seem rather plausible.*

WAYNE R. ANDERSON

46 ***Starkle, Starkle, Little Twink***

There is an informal, effective way to challenge astrology that is neither a disdainful dismissal nor a tedious, scientific recital. It is just a matter of asking some simple questions.

JUDITH HAYES

49 **Of Planets and Cognitions: The Use of Deductive Inference in the Natural Sciences and Psychology**

Inferences of unobserved cognitive events in psychology are not the same as the inference of the recently discovered, but unobserved extrasolar planets in astronomy. Unlike astronomy, or the other natural sciences, psychology has no experimental foundation of laws that justify such inferences.

HENRY D. SCHLINGER JR.

COLUMNS

EDITOR'S NOTE 4

NEWS AND COMMENT

Massive Uncritical Publicity for Supposed 'Independent UFO Investigation' Demonstrates Media Gullibility Once Again / It Is Time for TV Networks to Admit Their Role in Misleading Public About UFOs / 'Pi' April Fool's Joke Gets Out of Hand—and Goes Round the World / India Honors Premanand for Exposing 'Miracles,' Promoting Science / Into the Nagual at Last: New Age Author Carlos Casteneda Dies / New Poll Points to Increase in Paranormal Belief / Folk Beliefs May Increase Cancer Deaths / The Aztec UFO Symposium: How This Saucer Story Started As a Con Game / The Roswell Type 5

NOTES OF A FRINGE-WATCHER

What's Going On At Temple University?

MARTIN GARDNER 14

INVESTIGATIVE FILES

Alien Implants: The New 'Hard Evidence'

JOE NICKELL 18

PSYCHIC VIBRATIONS

Apocalypse Foiled Again; UFOlogists Shoot for the Moon

ROBERT SHEAFFER 21

NEW BOOKS 57

ARTICLES OF NOTE 58

SCIENCE BEST SELLERS 58

FOLLOW-UP

Harold Puthoff Responds on Zero-Point Energy

HAROLD PUTHOFF 60

Responding To Puthoff: Zero-Point Energy

MARTIN GARDNER 61

LETTERS TO THE EDITOR 64

BOOK REVIEWS

Nonconscious Movements: From Mystical Messages to Facilitated Communication

by Herman H. Spitz

CAROL TAVRIS 52

UFOs & Alien Contact: Two Centuries of Mystery

by Robert E. Bartholomew and George S. Howard

ROBERT A. BAKER 53

Therapeutic Madness

by John I. Lynch

ROBERT A. BAKER 56

EDITOR'S NOTE

To Misjudge Probabilities is Human

One of the marvelous attributes of the human brain is a highly developed ability to recognize patterns and search for meaning. For the most part this wonderful skill serves us well. It is essential in adapting to our environments and gaining any true understanding. It is part of how we can be so intellectually agile and intuitive. The problem is, we don't seem to know when to quit. Our brains often persist in seeking patterns and meaning even when there isn't any, and then we make mistakes.

In this issue, in a special section titled "What Are the Chances?" we present three articles about one of the areas seemingly most difficult for our brains to cope with and therefore most prone to mistaken judgments: estimating probabilities. We're just not very good at that.

In "Coincidences: Remarkable or Random?" University of Virginia professor emeritus of chemistry Bruce Martin demonstrates how most coincidences to which we attribute amazingly high improbabilities are actually far more likely than we think. The problem of judging the likelihood of coincident birthdays among any given size group of people is just one of the highly counterintuitive examples. Presidential "coincidences" still seem to get regular press attention. Seemingly unlikely runs of good or bad luck, whether in friendly coin flips, serious gambling, sports performance, or the stock market, often have a much simpler explanation than the complicated ones we often attribute to them: normal random variation.

In "Numerology: Comes the Revolution," DePauw University mathematics professor Underwood Dudley shows not only that strange things can happen by coincidence but strange things *must* happen by coincidence. He gives some revealing examples and explores the world of numerologists: those who believe that numbers cause events. We've seen them often—the pyramidologists, Bible-searchers, and others who comb data looking for patterns that seem meaningful and (surprise!) always find them. How could they not? Implicit in both these articles is the general point: You can always comb random data and find regularities—if you don't specify in advance what you are looking for. Dudley's no stranger to bringing a wry, critical, mathematical voice to these topics. He adapted his article from his new book *Numerology,* and it is a sort of a sequel to his earlier work, *Mathematical Cranks.*

Finally, award-winning *Los Angeles Times* science writer K.C. Cole takes us on a lighthearted journey into another area of common human misperception based partly on poor estimation of probabilities: risk perception. Taken from her delightful book *The Universe and the Teacup,* her "Calculated Risks" shows how we are notoriously bad at assessing risk. But once again things are more subtle than they might seem. In assessing risk, we often go beyond strict numerical accounting to bring into play human and other psychological factors. So we're not altogether wrong in our risk assessments, just human.

* * *

To all who regularly encounter friends or students deeply curious about topics that we may find nonacademic and certainly unscientific, Frank Trocco of Leslie College and Vermont College provides some useful guidance. In "How to Study Weird Things," he shows how to turn that interest into the beginning of an understanding of how science might approach such things. Students want to appear credible, and to be credible, they must read and address the arguments of nasty skeptics and narrow-minded scientists, if only to frame their counter-arguments. And when they do, they sometimes—not always, but sometimes—learn some useful lessons about science, the scientific method, and critical thinking.

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Massive Uncritical Publicity for Supposed 'Independent UFO Investigation' Demonstrates Media Gullibility Once Again

On Monday, June 19, 1998, all of the major media outlets were suddenly filled with accounts proclaiming that an *independent panel of scientists had taken a* fresh look at the UFO question, and had concluded that the matter needed to be taken seriously after all. The *Washington Post* wrote glowingly of "the first independent scientific review of the controversial topic in almost 30 years" that supposedly found "cases that included intriguing and inexplicable details, such as burns to witnesses, radar detections of mysterious objects, strange lights appearing repeatedly in the skies over certain locales, aberrations in the workings of automobiles, and irradiation and other damage found in vegetation." ABC News reported, "A panel of scientists is conducting the first independent UFO investigation in nearly 30 years." The Associated Press reported that "an international panel of scientists" was convened to conduct "the first independent review of UFO phenomena since 1966."

While finding that eyewitness testimony about UFOs was of little scientific value and "there was no convincing evidence pointing to . . . the involvement of extraterrestrial intelligence" (a major point widely underplayed by news reports), the panel had concluded that "the physical evidence in some UFO sightings merits further serious scientific review."

However, what virtually every major news organization completely overlooked is that this was far from an "independent" review of UFOs. The Society for Scientific Exploration, sponsor of the panel, is not a "mainstream" scientific organization. Instead, it is a group inclined toward belief in paranormal phenomena, albeit one with many scientists among its membership. This could have been easily determined by any reporter who would have taken the trouble to peruse their Web site (www.jse.com), or to interview them meaningfully. For the past eleven years, the *Journal of Scientific Exploration* been publishing articles suggesting that at *least some paranormal claims are true,* and have been verified scientifically. On the SSE Web site are found papers purporting to demonstrate that dowsing has been verified, that young chicks have psychokinetic powers, and that reincarnation is not only verified, but that past lives are often indicated by the presence of birthmarks. The Web site proclaims the journal's intention to publish supposedly scientific papers on "UFO and related phenomena, clairvoyance, precognition, telepathy, psychokinesis, out-of-body and near-death experiences, cryptozoology, evidence suggestive of reincarnation, alternative medical practices, astrological claims, ball lightning, crop circles, apparent chemical or biological transmutation (alchemy), etc." Despite the impressive jargon and in some cases the impressive academic degrees of the authors, these papers have been absolutely unconvincing to mainstream scientific journals and organizations, and, far from pointing the way to further research, they have been quite deliberately ignored.

The SSE UFO Panel invited only pro-UFOlogists to present supposed "evidence"; the skeptical viewpoint was evidently felt not to be worth considering. The panel was funded by Laurance Rockefeller, whose previous financial support for pro-UFO organizations is well-known. The scientific sessions of the panel were moderated by David E. Pritchard, professor of physics at the Massachusetts Institute of Technology and Harold E. Puthoff, director of the Institute for Advanced Studies in Austin. Puthoff is well-known in parapsychological circles for his experiments with Uri Geller at SRI International during the 1970s, which are now viewed even by most parapsycholgists as hopelessly flawed. He is currently researching "Zero-Point Energy," i.e. supposed techniques for extracting useful amounts of free energy from the vacuum of space. (*see "Zero-Point Energy and Harold* Puthoff," SKEPTICAL INQUIRER, May/June 1998, and the subsequent exchange between Puthoff and Martin Gardner in this issue, page 60.) *The Journal of Scientific Exploration* has published Puthoff's writings on that subject. Pritchard was one of the organizers of the 1992 Abduction Study Conference at MIT, along with Budd Hopkins, Dr. John Mack of Harvard, and David Jacobs of Temple University. This conference, which was overwhelmingly slanted toward the pro-UFO and pro-abduction position, was intended to provide scientific credibility for the Hopkins-Jacobs-Mack abduction hypothesis, which centers around a supposed alien plan to breed part-human, part-alien hybrids. The conference not only failed to sway the scientific community, but has become something of an embarrassment to UFO believers as it made public for the first time some of the more outlandish claims and practices of the UFO abductionists.

The UFO "experts" who were invited to present supposed evidence to the SSE UFO panel were: Richard Haines, psychologist and longtime pro-UFO researcher; Illobrand von Ludwiger, director of the Central European branch of MUFON; Mark Rodeghier, director of the Center for UFO Studies, Chicago; John Schuessler, Deputy Director of MUFON; Erling Strand, one of the directors of UFO Norway; Michael Swords, Scientific Director of CUFOS; Jacques Vallee, the author of many UFO books, who has repeatedly suggested that UFO reports signify something momentous precisely because they do not make sense; and Jean-Jacques Velasco, the Director of SEPRA, the French Space Agency (CNES) UFO Study. Not one of these investigators is a skeptic in any

sense of the word; all of them have long-standing positions of UFO advocacy.

Amazingly, the cases that the panel found so impressive are old ones that have long been touted by UFO promoters and have failed to convince skeptics inside or outside the scientific community. One of their principal cases was an alleged UFO "landing trace" case in Trans-en-Provence, France. The soil appeared to have been compacted, and traces were found of iron, zinc, and phosphates. However, the connection of the alleged 'landing trace' to any aerial event rests upon the testimony of just one individual. If he is either hoaxing or deluded, then the incident proves nothing about UFOs no matter how many tests might be performed upon soil samples.

The Cash-Landrum case of 1980 was presented as evidence of physiological effects upon witnesses. Exposure to a flaming UFO is said to have produced blisters, digestive disorders, burns, hair loss, and other dramatic effects. However, the accuracy of these claims is impossible to assess, as only selected por-

COMMENTARY

It Is Time for TV Networks to Admit Their Role in Misleading Public About UFOs

Now that Cable News Network has admitted that producers of its *NewsStand* television program on June 7 knowingly omitted important contrary evidence to falsely accuse the U.S. military of having dropped nerve gas on a Laotian village during the Vietnam War, it is time for the television networks to admit they have withheld evidence from the public to make a much more serious allegation against the U.S. government.

Public opinion polls indicate that more than half the public believes the U.S. government is involved in a "UFO coverup." This is testimony to television's pervasive influence on public opinion and its knowingly biased treatment of the Roswell "crashed-saucer" incident.

CNN viewers saw and heard former Army Lt. Robert Van Buskirk allege not only that nerve-gas had been dropped from helicopters on a Laotian village but that his platoon had killed two Caucasians he believed to be American defectors. Withheld from CNN viewers was the fact that when Van Buskirk published a book in 1983 about his wartime experience in Southeast Asia, he made no mention of either incident. Van Buskirk's explanation is that while writing his book he was suffering from "repressed memory syndrome," which vanished when he was being interviewed for the CNN program.

Even if CNN's nerve-gas charges were true, at worst they would reflect adversely on only a few American military officials and perhaps on a single U.S. President—if he had in fact approved such action. The Roswell Incident crashed-saucer cover-up, if true, would represent a policy of ten presidents and their administrations to withhold the truth about UFOs from the American public and the world.

As described in my article "That's Entertainment: TV's UFO Coverup" (SKEPTICAL INQUIRER, November/December 1996), during the mid-1990s I was interviewed for numerous TV shows dealing with the Roswell Incident. On every occation, I gave the producer photocopies of once "Secret" and "Top Secret" USAF and CIA documents which showed that if a flying saucer had crashed in New Mexico, top intelligence officials were never informed of that fact—even five years later. I told the TV producers: "These documents have never before been shown on TV; you can be the first to inform the public." Yet invariably these documents were never shown or discussed.

For example, when CBS News visited Roswell to film a segment for its show *48 Hours,* I was interviewed. While the camera was filming, I whipped out and held in front of the camera a copy of a "Top Secret" USAF/Navy document dated December 10, 1948—prepared more than a year after the alleged crashed-saucer recovery. I read its conclusion, that it was then suspected that unexplained UFOs might be Soviet spy vehicles.

When the CBS Roswell segment was aired, the entire interview with me, and the showing and discussion of this "Top Secret" document, ended up on the cutting room floor. The host for that television show was Dan Rather. Two hours earlier, Rather appeared on the CBS evening news program where controversial issues usually are treated in a balanced manner.

Viewers watching the Roswell segment of *48 Hours* would, understandably, expect that CBS News and Dan Rather were providing them with an equally balanced treatment of the Roswell Incident and (alleged) government coverup. *Viewers were being misled by CBS.*

In view of the CNN nerve-gas program fiasco, can we expect CBS and other TV networks to re-examine their coverage of the Roswell Incident and charges of government UFO coverup—and to set the record straight? Don't hold your breath!

—Philip J. Klass

Philip J. Klass, author of The Real Roswell Crashed Saucer Coverup *and* UFOs: The Public Deceived, *is chairman of CSICOP's UFO Subcommittee and a veteran Washington aerospace journalist.*

tions of the medical records of the individuals involved have ever been released. Furthermore, no other witnesses in this suburban area of Houston reported seeing anything at all, and no effects of the UFO's supposed heat and/or radiation were detected on any animals, plants, or inanimate matter. The witnesses' claim that the UFO was being pursued by exactly twenty-three large dual-rotor helicopters (which if true would certainly have attracted a great deal of attention and would have been verifiable afterward) raises serious issues concerning witness reliability and candor. As before, the link between a "physical effect" and any alleged UFO is quite tenuous. Jacques Vallee made presentations concerning a number of alleged "artifacts," none of which can be excluded as ordinary terrestrial objects. One of the cases Vallee presented was the supposed UFO crash in Aurora, Texas, in 1897, which has long been dismissed as a hoax even by many pro-UFOlogists.

The fallacy underlying all of the panel's "evidence" is that no matter how indisputably real any measurement may be, its relationship to any alleged aerial phenomenon is merely anecdotal. The late J. Allen Hynek was fond of citing in his lectures supposed animal reactions to UFOs as proof that the case for UFOs does not rely solely on fallible eyewitness testimony: animals, he assured us, do not suffer from mass hypnosis. He never seemed to understand the objection that our knowledge of the animals' supposed actions rests entirely upon uncorroborated testimony.

It has not been a good year for the giants of American journalism. CNN and *Time* were forced to retract, and even apologize for, an unfounded story that the U.S. military used nerve gas against defectors. *The New Republic* fired one of its reporters, and the *Boston Globe* saw one of its reporters resign under pressure, both for fabricating stories in whole or in part. The Associated Press reported the death of Bob Hope while the famed comedian sat at his home, calmly eating breakfast. Close on the heels of these embarrassments comes a gaffe in which nearly every major news outlet uncritically heralded as an "independent scientific review of the UFO phenomenon" an in-house study from a fringe organization whose conclusion, because of the group's very makeup, was never in doubt. While perhaps not as egregious as the other examples, it illustrates all too plainly the tendency of the contemporary American news media to leap before they look.

—Robert Sheaffer

Robert Sheaffer's latest book is UFO Sightings: The Evidence, *just published by Prometheus books.*

'Pi' April Fool's Joke Gets Out of Hand—and Goes Round the World

NMSR *Reports*
The Newsletter of the New Mexicans for Science and Reason

Vol. 4, No. 4 April, 1998

APRIL MEETING

Keith Gilbert
"What Are Your Chances?"
7 PM, Wednesday, April 8th, 1998

Alabama Legislature Lays Siege to π

It began as a simple parody. But, thanks to the increasingly popular Internet, it grew to become a new urban legend.

Just before April 1, 1998, New Mexico physicist and skeptic Mark Boslough wrote an April Fool's parody on legislative and school board attacks on evolution in New Mexico. He took real statements from New Mexico legislators and school board members supporting creationism, and rephrased them in a fictional account detailing how Alabama legislators had passed a law calling for the value of pi (3.14159 ...) to be changed to the "Biblical" value of 3.0.

Why Alabama? Because it was a believable locale, given that state's anti-science actions (such as requiring an "Evolution is just a theory" disclaimer to be pasted in all biology textbooks). And Alabama, like New Mexico, is a state with many smarter-than average people, yet dumber-than-average politicians. Current Alabama Governor Fob James did nothing to help change that image when he recently (June 1998) put on a monkey act while making fun of evolution. And his predecessor, Governor Guy Hunt, wasn't a big help either—one of the commenters on the parody wrote that Hunt "puts the Goober in gubernatorial."

Why change the value of pi? Because legal attempts to set the value of mathematical constants are as ludicrous as the current legal attacks on biology. And it was hoped that engineers, the "victims" of the pi legislation, would see the analogy to attacks on biology, which are frequently led by creationists specializing in engineering.

The parody was chock full of joke hints—for example, the author was named as April Holiday, and the Internet version credited the story to "the Associmated Press." The governor of Alabama was named as Guy Hunt, not the current governor (Fob James). The article was tagged with an Internet address that ended with "/april/fool.htm." And it contained several puns, such as a dig at "traditional values" (as in the "traditional value of pi, 3.0"). But the main part of the article was a realistic-sounding account of how Huntsville rocket scientists and Alabama professors were furious over the changing of pi, and included statements from legislators and board members supporting the action.

At Boslough's request, New Mexico physicist and SKEPTICAL INQUIRER consulting editor David E. Thomas posted the parody on "talk.origins," the Internet's USENET group devoted to discussions of creation and evolution. The parody was also sent to a list of New

Mexico scientists and citizens interested in evolution, and was printed in the April issue of the New Mexicans for Science and Reason newsletter *NMSR Reports.* Thomas posted the story on the Internet on April 1, and followed later that day with a full confession and explanation. Several creationists commented on the piece, but reaction died down after a few days.

Or so it seemed. Unbeknown to the author and poster, several readers of the original parody forwarded it to their friends, and to other newsgroups. And, in a stunning example of adaptive radiation, the prank story was forwarded again and again. As the story was forwarded, all hints of the parody were deleted, and replaced with official-sounding titles and names. For example, "April Holiday" was on one occasion replaced with "SLA/Physics Lab." Soon, it was was being discussed by people from Germany, Norway, China, Australia, and all over the globe. It was all the rage in USENET groups such as alabama.politics, sci.math, alt.folklore,urban, and soc.culture.Jewish. While some Internet users realized it was not a real story, many others were taken in completely.

The story even worked its way to Huntsville, Alabama, where it became a hot topic on talk radio there. The Associated Press (the real one) picked it up, and explained it was a hoax. But interest in the story persisted on the Internet. As of mid-June, it looks as though the fuss is dying down, but that could be just a lull in the storm.

In 1897, the Indiana legislature considered re-defining pi. But if you hear about a similar story in 1998, in Alabama, please be assured—this one was a joke. A joke that got out of hand, and—in an international game of "Gossip"—has apparently grown to become a new urban legend.

—David E. Thomas

David E. Thomas is a New Mexico physicist and SKEPTICAL INQUIRER *consulting editor.*

Indian skeptic B. Premanand

India Honors Premanand for Exposing 'Miracles,' Promoting Science

The noted Indian conjurer and skeptical investigator Premanand has received the government of India's highest award for science popularization.

B. Premanand was honored by the National Council for Science and Technology Communication, Department of Science and Technology, Government of India, with its national award for the Best Effort in Science Popularization during the period 1992–1996.

Premanand, chairman of the Indian Skeptics and editor of its publication, *Indian Skeptic,* has devoted years to exposing as psychic trickery the supposed miracles of India's self-proclaimed "godmen." Through tours and appearances he has become known to skeptics and scientific audiences worldwide.

Here is Premanand's citation: "For his relentless efforts towards promotion of scientific attitudes among common people, all over the country, through lecture-cum-demonstrations and scientific explanation of hundreds of the so-called miracles employed by self-styled godmen; and through books written and television shows conducted by him on the same subject in the country as well as outside."

It was signed by Y. K. Alagh, Chairman, NCSTC, and Union Minister for Science and Technology.

Into the Nagual at Last: New Age Author Carlos Casteneda Dies

The New Age form of shamanism was ushered into popular awareness largely through the teachings of don Juan Matus, the mysterious Yaqui Indian sorcerer made popular during the past three decades through ten books by Carlos Castaneda. Don Juan, the stories tell us, disappeared directly with his living body a decade or so ago into the Nagual or spiritual state. Castaneda, however, apparently died more prosaically in Westwood, California, and without publicity on April 27. His death wasn't announced until June. He had liver cancer and he was believed to be sixty-six or seventy-two, take your pick. His cremated remains were taken to Mexico without fanfare.

Castaneda rarely gave interviews (one of his last was "Portrait of a Sorcerer" in *New Age Journal* April 1994). He would not permit photographs. He was alleged to have a small cult of followers who tried, together with him, the sorcery techniques he wrote about. From what we know about him and his storybook persona, Castaneda seemed to lead a reclusive, emotionally loveless life.

Several years ago I spent twelve hours in discussions with a young, bilingual man who claimed to be part of Castaneda's "inner circle." He described the "Tensegrity" movements years before they were published in *Yoga Journal* ("Carlos Castaneda's Magical Passes," February 1998). Two women from this circle, Taisha Abelar and Florinda Donner, have published in the same occult adventure genre as the don Juan books.

Serious anthropologists (see Richard De Mille, *Castaneda's Journey,* 1978; The *Don Juan Papers,* 1980; Jay Courtney

Fikes, *Carlos Castaneda, Academic Opportunism, and the Psychedelic Sixties,* 1993) have convincingly dismissed Castaneda's don Juan stories as clever fiction. Castaneda, however, never veered from his claim that don Juan actually lived, and he claimed that his books were nothing less than interpretations taken from field notes and real experiences.

The occult experiences and powers are what so intrigue the readers who want to become "warriors" or sorcerers like don Juan. Throughout the books Castaneda offers elusive techniques to better align with occult power. For instance, the apprentice can learn to create and move an "assemblage point," a way of re-energizing the self so one can literally disappear and appear at will. In *Star Trek,* Scotty, the starship engineer, "beamed" you up; in Castaneda stories, you learn to do it all by yourself as you "fly with intent" to different "dreaming" realities. The don Juan stories have amounted to head trips for most readers who dared not to ingest the dangerous drugs like Jimson weed mentioned in the early books, and who could not find a suitable shaman like don Juan—he was nowhere to be found. So, it surprised many seekers when Castaneda described Tensegrity in illustrated detail as certain martial art-like movements in *Yoga Journal.*

Using these movements the frustrated seeker now has the potential to enter the powerful altered states of perception Castaneda talks about. With the Tensegrity techniques, the Castaneda cult finally has something to compete with other magic power groups that offer yogic flying techniques, meditation mantras, heavy breathing (pranayama), screaming, chanting, or trance dancing as the means to become supermen. I have found nothing to prove that any of these techniques can facilitate true occult powers, but there is a variety of evidence that they do alter perception, sometimes radically and even harmfully (Margaret T. Singer, *Cults in our Midst,* 1995). If Castaneda ever possessed these powers, we will never know as we can no longer test him. If there is a sorcerer's heaven, I have a hunch that Carlos Castaneda is now with don Juan dreaming up new tales of power.

—Joe Szimhart

Joe Szimhart has researched fringe cults and the New Age movement for more than two decades, and he has helped many people to recover from harmful experiences in that milieu.

New Poll Points to Increase in Paranormal Belief

Are paranormal beliefs on the rise? Turn on the television, listen to the radio or browse the best seller shelves and you'll notice an apparent explosion in the quantity and popularity of mass media paranormal presentations. Televised episodes of the immensely popular *X-Files* draw 17–25 million viewers. On radio, Art Bell's fantasy-laden *Coast to Coast AM,* with an average of 8.75 million listeners tuning in per week, is ranked fourth among American radio talk shows. Paranormal popularity even extends to book sales. Dubbed a "publishing miracle" and fueled by appearances on *Oprah Winfrey* and *Larry King Live,* psychic medium James Van Praagh's *Talking to Heaven* has been on the New York Times nonfiction best seller list for months.

Now a recent Yankelovich Partners poll lends further support to the notion that belief in the paranormal is on the rise. Published in an April 20 *USA Today* Snapshot titled "Belief in the Beyond," a 1997 poll compared current belief in paranormal phenomena with belief levels measured in 1976.

Maria Miller, Director of Client Services for Yankelovich Partners, deems the poll an indication of a "significant increase in paranormal belief." According to Miller, other studies by Yankelovich have indicated that Americans are now trying to "find something in their lives beyond the material." She points out that one source for growth in paranormal and spiritual belief might be the evolving attitudes of aging Baby Boomers. As the generation grows older, they increasingly seek to get in touch with themselves. Miller cites other Yankelovich polls that show increased consumer spending in areas that bring internal reward. When asked about the recent increase in media presentations of the paranormal, Miller believes the reason simple: "The public wants it, they're looking for it."

The Yankelovich results are difficult to verify since other polls conducted by the Gallup Organization and Roper

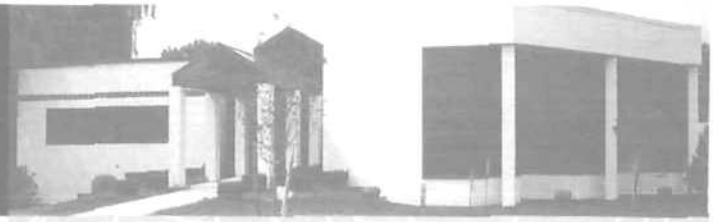
continued on page 12

Which if any of the following do you believe at least to some degree?

Belief	1997	1976
Spiritualism	52%	12%
Faith Healing	45%	10%
Astrology	37%	17%
UFOs	30%	24%
Reincarnation	25%	9%
Fortune Telling	14%	4%

(1976 N=8,709; 1997 N=1,000 Margin of error = +/- 3–5%)

Fund for the Future



CSICOP AT THE CENTER FOR INQUIRY

1·9·9·8 PRIORITY

Using the Media & Telecommunications to Promote Science and Reason

The Fund for the Future is a capital campaign to provide CSICOP the resources needed to more effectively influence media and public opinion. The 90s have been defined by a telecommunications revolution, along with an explosion of misinformation available to the scholar and citizen alike. The hunger for superstition, pseudoscience, the paranormal and miraculous solutions has never been more acute.

The Ten-Year Plan

1998 Contributions are needed for current priorities:

- Increased media appearances by skeptical spokespersons
- Press releases, opinion pieces and media alerts
- Greater exposure through the Internet, including webcasting
- National initiatives coordinated by the Council for Media Integrity
- Instructional materials introducing skepticism to elementary and secondary school students
- Video production

Newsflash: This November CSICOP will convene a conference in Southern California to publicize many of these initiatives

Council for Media Integrity

Formed just weeks after its inclusion in the Ten-Year Plan, the Council for Media Integrity will monitor and rebut media programs that convey unfounded claims and mislead the public about science. Members include Steve Allen (chair), Stephen Jay Gould, and many others. CSICOP will invest in electronic infrastructure to facilitate rapid response to irresponsible programs.

Enhanced Library Resources

The Center for Inquiry's skeptics' library—already the finest of its kind in the world—needs expanded funding to enlarge its core collection and add electronic media. Worldwide modem access to the library's catalog is already nearly complete.

Adult Education

The Council cosponsors the Center for Inquiry Institute, which has already expanded its offerings to include a new three-year certificate program in science and skepticism. Sessions are scheduled in Amherst and Los Angeles.

How Can You Help?

CSICOP has established its expertise and integrity. It's time to command more media attention and a larger audience. The Center for Inquiry Fund for the Future is about new methods of outreach and broader influence, and is driven by an ambitious ten-year strategic plan for growth.

We depend on the support of readers and friends to continue leading the international skeptical movement. Gifts to the Fund for the Future provide the resources we need to respond to today's challenges.

All gifts are gratefully accepted. The Fund for the Future welcomes gifts of encouragement and major investments.

Cash contributions and gifts of stock are needed for immediate growth and new initiatives. We also offer a range of planned giving opportunities, from bequests to assorted tax-advantages trusts and pooled funds. Planned gifts support our work in the future and can provide an income stream for you and a beneficiary. You may also make a gift supporting the general endowment, or establish a special purpose fund underwriting a long-term project which expresses your personal interests and commitment to skepticism.

In today's stock market, gifts of highly appreciated securities offer particular advantages to the donor. When donating stock to a charitable organization, you avoid taxes and maximize the impact of the asset you are donating.

Contact Anthony Battaglia
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Martin Gardner
Honorary Co-chair

Steve Allen
Honorary Co-chair

Regional Outreach

With the establishment of The Center for Inquiry–West (Los Angeles), The Center for Inquiry–Midwest (Kansas City) and The Center for Inquiry–Rockies (Boulder, Colorado), giant steps have been taken to enhance direct field service to skeptical activists. Additional regional Centers are planned with expanded calendars of activities.

Priority For the Young

To present the skeptical message more compellingly to the young, CSICOP will develop new materials—ranging from age-appropriate print publications to audio and video cassettes and instructional coursework. Goals include enhanced understanding of science and improved critical thinking skills.

Reports indicate relatively little change in belief for the topics asked by Yankelovich. Differences may be explained by the use of different wording in questions and different descriptions for paranormal topics. Both the Gallup and Roper Reports polls also vary across questions as to whether there are comparable results dating back to the 1970s. Tom W. Clark of the Chicago-based National Opinion Research Center adds that the manner in which questions are asked can affect results. "What prior questions were asked? What is the context effect? Often, prior questions can suppress or buoy an answer." Clark also notes that it is important to examine the representativeness of the poll sample. "If those polled are made up of more than one socioeconomic class or ethnicity it can bias the answers."

In a 1992 paper titled "Phantom Changes on Paranormal Beliefs," Clark criticized a 1990 Gallup poll that showed apparent substantial growth in belief of certain paranormal phenomena as a "methodological artifact." He cited differences in response options and question wording between the 1990 poll and the comparison Gallup poll from 1978. "As a result," Clark wrote, "despite Gallup's claims, there is no evidence that belief in the paranormal has increased over the last decade."

The measurement of society-wide paranormal beliefs, their change over time and their relation to the media merit ongoing study. The best available polls and research comparing current levels of belief to the 1970s are inconclusive. Meanwhile, there is continued debate over whether paranormal beliefs are media-driven. A recent study conducted by Purdue University Professor Glenn Sparks reveals a direct correlation between credulous media portrayals and increase in viewer belief (see *SI*, July/August).

—Matt Nisbet

Matt Nisbet is Director of Public Relations for CSICOP.

Folk Beliefs May Increase Cancer Deaths

A study published in the June 10, 1998, *Journal of the American Medical Association* (JAMA) suggests that the prevalence of folk beliefs among Black women may help explain that group's higher breast cancer mortality rate. Although the incidence of breast cancer is lower among Black women than White women, their mortality rate is consistently higher than Whites. While as a whole, Blacks have less access to medical care, the study reports that socioeconomic variables alone cannot account for the disparity.

Part of the problem may lie with widespread folk beliefs and superstition. Folk belief was found to be a significant predictor of breast cancer mortality. Black women agreed with such statements as, "Air causes a cancer to grow faster" and "Someone can give you cancer by putting a spell on you" in higher numbers than White women. The Blacks studied were three times more likely than Whites to delay seeking treatment until their cancer was advanced, and the researchers concluded that cultural and folk beliefs were strongly associated with the disparity. Fatalistic views (such as "When I get sick, I am to blame"), religious beliefs ("If I pray, God will cure my cancer"), and the belief that herbs and chiropractic can heal cancer also contributed to the effect.

Five hundred forty Black women in rural North Carolina with newly diagnosed breast cancers were interviewed about their attitudes toward breast cancer, among other topics. The study was headed by Dr. Donald Lannin, a cancer surgeon at the East Carolina University School of Medicine in Greenville, North Carolina. Although these cultural beliefs were strongly associated with low income, they were even more strongly associated with race, indicating that some higher-income Blacks shared the beliefs.

The study also has implications for earlier cancer treatment. It may be possible to modify certain folk beliefs to encourage earlier diagnosis. Advances in breast cancer screening may not lead to a decrease in Blacks' mortality rate if incompatible folk beliefs are not addressed.

—Benjamin Radford

The Aztec UFO Symposium: How This Saucer Story Started As a Con Game

When the Aztec, New Mexico public librarian, Leanne Hathcock, read about Aztec's own crashed saucer story from the late 1940s, she decided to organize a symposium to mark the (alleged) fiftieth anniversary of the event, which supposedly first took place in May of 1948. When I learned about this, I dug into the Aztec story, and what I found was amazing. Phil Klass supplied me with a copy of pro-Roswell writer William Moore's devastating 1985 MUFON Symposium analysis of the Aztec tall tale. I found more revealing information in Curtis Peebles's 1994 book *Watch the Skies*, and in the Air Force's 1997 Roswell report, *Case Closed*.

I called the librarian, and got myself accepted as a symposium speaker. In Aztec, I explained the source of the legend of crashed saucers and bodies. It turns out that two grifters, Silas M. Newton and Leo A. GeBauer, met in 1949 while fleecing the same Denver millionaire. GeBauer liked to sell his cons with devices like the "doodlebug," a secret magnetic device that could supposedly locate oil or gold. Newton was suspected of pumping oil into wells by night, so that he could impress potential investors by pumping it out the next day. Newton and GeBauer were driving through the Mojave desert in August of 1949 when they heard a report of a crashed "alien saucer." Then and there,

they hatched the mother of all cons.

Aztec was chosen as the site of the fictional crash, most likely because GeBauer had just been there scouting oil opportunities for Newton. GeBauer posed as a mysterious and powerful government Ph.D. scientist named "Dr. Gee." In reality, he maintained shop equipment at a plant in Arizona. Newton himself told many investors of the recent crash of an alien ship, the analysis by top-secret government labs, and the discovery of magnetic devices that could find oil and gold. Then came the pitch.

Newton told the investors that he could get them access to this incredible "alien" technology . . . for a price. Of course, the alien gadgets were really just GeBauer's magnetic doodlebugs. Newton even talked Hollywood reporter Frank X. Scully into writing a book about the "Aztec crash." Scully trusted Newton completely, and—without a shred of evidence—proceeded to write a book that, in fact, only served to give two sleazy con men some undeserved credibility. But *San Francisco Chronicle* reporter J. P. Cahn caught on to the sting. While talking to Newton, Cahn boldly managed to switch a small piece of the "alien ship" with another piece of metal, and promptly had the "alien" material tested. It turned out to be earthly—the grade of aluminum used for pots and pans.

After Cahn's story was printed in *True* magazine in 1952, several swindle victims wrote to tell their stories of Newton and GeBauer. Most of these victims couldn't press charges because of statutes of limitations—most, but not all. The aforementioned Denver millionaire, Herman Flader, had a solid case. The FBI arrested Newton and GeBauer, and the con men were quickly convicted. One of the high points of the November 1953 trial took place when the hustlers' $18,500 "tuner" was shown to be identical to a local surplus unit costing $3.50. Cahn wrote another *True* exposé on the Aztec UFO swindlers in 1956.

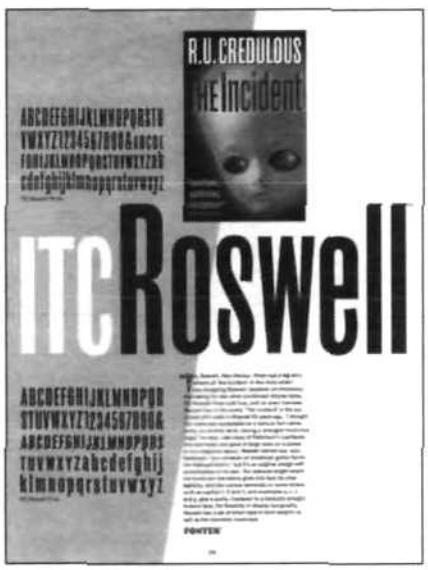
Even though the Aztec story is more pitiful than the Roswell legend, which at least involves *some* physical evidence, elements of Aztec still remain in popular UFO culture. On May 31 and June 1, 1998, on the nationally syndicated radio programs "Art Bell's Dreamland" and "Art Bell Coast-to-Coast," UFO researcher Linda Moulton Howe described a top-level government document that supposedly proves that the U.S. has known about the existence of real alien "saucers" for decades. She described the document—a secret FBI memo from March 22, 1950, written to J. Edgar Hoover himself. Memo author Guy Hottel, a special agent for the FBI, described an investigator's report of a flying saucer recovery in New Mexico, with mention of three saucers, three-foot tall bodies, metallic cloth, and bandaged alien bodies. The crash was supposedly due to interference from high-powered radar.

But *all* of these elements (saucers, 3-foot-tall aliens, cloth and tape, radar site) have been firmly linked to the yarns spun by our two swindlers! William Moore even traced how the story got from Silas Newton to J. Edgar Hoover: Newton told George Koehler (employed at radio station KMYR in Denver), who told Morley Davies, who told Ford dealers Jack Murphy and L. J. van Horn, who told auto dealer Rudy Fick, who told the editor of the Kansas City Newspaper *Wyandotte Echo*. By that time, Koehler had become "Coulter."

The *Wyandotte Echo* printed the account on January 6, 1950. This article was picked up by other news sources, where it caught the interest of the Air Force Office of Special Investigations (OSI). An OSI agent passed the story on to Guy Hottel of the FBI, and Hottel wrote the now-famous memo to Hoover, describing the eighth-hand story of the alien crash.

And what do residents of the Aztec area recall about the supposed incident? Hundreds have been interviewed over the years, but—not surprisingly—*no one* seems to recall the event. Aztec has a long way to go before it can catch up to Roswell. Considering the dubious benefits to be derived from crass marketing of aliens, maybe they should quit while they're ahead! At least they got a taste of their possible future with one of my fellow symposium speakers, Dan Salters. Salters rambled on for hours about Earth running out of oxygen in thirty-two years, the aliens are here to wake us up, and said it doesn't matter if the Aztec or Roswell crashes are "real"—they *become* real when we believe in them.

—David E. Thomas



The Roswell Type

Now there's a Roswell type.

No, not type of person. A Roswell typeface. Inspired by the hoopla of the Roswell crashed-saucer tale, type designer Jim Parkson has devised a new typeface and christened it "ITC Roswell." The graphic above is a page about it from a new typography catalogue.

"Yes, Roswell, New Mexico," Parkinson writes. "There was a big anniversary of 'the incident' in the news while I was designing Roswell," he said, discussing how his new ultra-condensed display types, ITC Roswell Three and Four, work. "I thought the name was acceptable as a serious font name, while, on another level, having a strangely humorous edge." □

What's Going On At Temple University?

In recent years Temple University, a distinguished coeducational institution in Philadelphia, has become a center for the promulgation of some of the wildest aspects of pseudoscience. It all began in 1986 when Richard J. Fox, chairman of Temple's board of trustees, met with some fringe scientists in London. He became impressed by their difficulties in getting work published that went beyond "mainstream paradigms." "Paradigm" is still a favorite buzzword of maverick scientists and those who write about them.

There was a crying need, Fox decided, for an organization that would permit fringe scientists to interact with mainstream scientists and provide a forum for discussing their results. If Temple University would sponsor such a center it could make certain that high academic standards were maintained. Here is how Fox described the purpose of such an organization:

> The Center's overall objective is to create a legitimate place and environment where scientists, researchers, and thinkers from all areas of scientific and intellectual endeavor can come together and discuss their thoughts, projects, and ideas no matter how revolutionary, with complete confidence and comfort.

Martin Gardner's latest book is The Last Recreations *(Springer-Verlag, Copernicus, 1997), a collection of twenty-three of his* Scientific American *columns.*

Temple's president, Peter Liacouras, agreed. The center's mission, he declared, was "to examine critically frontier research projects that hold promise of future breakthroughs."

Temple's Center for Frontier Science, as it is now called, was founded in 1987. Since then it has sponsored a raft of conferences, and more that fifty lectures on Temple's main campus. Its periodical *Frontier Perspectives,* issued twice a year, has grown to more than eighty pages. I had not seen a copy until physicist C. Alan Bruns, at Franklin and Mitchell College, in Lancaster, sent a copy of Vol. 7, No. 1, 1998, to CSICOP's office, which in turn forwarded it to me.

Reading through its pages I could hardly believe my eyes. I had expected the magazine to be concerned with such outstanding frontiers as superstring theory, the nature of dark matter, the genetic origins of altruism, how organic molecules fold so rapidly, speculations about a "multiverse" in which endless universes, each with a unique set of laws, explode into reality, or supercomputers operating with quantum mechanics.

The "frontiers" covered in this peculiar journal are nothing of the sort. They are reports on research so far removed from reputable science that it is no wonder academic journals refuse such papers. Let me quickly review a few topics that dominate the Fall/Winter 1998 issue of this magazine.

Homeopathy is one of the center's

THE CENTER FOR FRONTIER SCIENCES AT TEMPLE UNIVERSITY

FRONTIER PERSPECTIVES

Volume 7, Number 1 Fall/Winter, 1998

Features

Is a Living System a Macroscopic Quantum System? 9
Cyril W. Smith

Biological Effects of Quantum Fields and Their Role in the Natural Healing Process 19
Glen Rein

Illness As a Delusion: Understanding the Meaning of Symptoms 24
F. Fuller Royal and Gregory Chun

An Integrated View On The Genesis Of Irreversible Anomie and Endotransmic Acculturation By Time Preservation. 34
P.M. Schwenkhorst

The Center as It Enters a New Decade 49
Nancy Kulenda

Invited Opinions

Is Good Mother Nature of Its Environment? 56
Peter Gramaglia

Behavioral Medicine and The Clinical Paradigm 64
Dan Kenner

On the Nature of Time 69
Ivan Semeliov

Departments

From the Editor's Desk 4
Correspondence 6
Update 8
Author's Guidelines 68
Book Reviews 69
New Books Received 72
Meetings of Interest 74
Networking 77
Periodicals of Interest 78
Websites 79
Cumulative Index 81
Colloquium Audiotape Tapes 82
In Memoriam 83
Center Events 84

ISSN 1062-4767 Volume 7, Number 1

favorite "frontiers." I don't need to remind *SI* readers that this is the nineteenth-century crank contention that certain substances, diluted to a degree that no molecules of the substance remain, have great potency in curing an enormous variety of ailments. Because homeopathic remedies consist of nothing but distilled water, it becomes necessary for its defenders to assume that, in some mysterious manner totally unknown to chemists, the water retains a "memory" of its vanished substances.

Cyril Smith, a British electrical engineer, writing on "Is a Living System a Macroscopic Quantum System?", relates "homeopathic potencies" to the Earth's electromagnetic fields that cause dowsing rods to turn. The Center obviously regards the ancient art of water witching

as another of today's science "frontiers." In 1989 it sponsored a conference on dowsing, chaired by Terry Ross, identified as a "well-known dowser."

Nancy Kolenda, executive editor of *Frontier Perspectives,* writes "The participants found the meeting to be a learning experience that gave them the opportunity to develop their skill as dowsers . . ." A second conference on dowsing, titled "Bioinformation Sensing and Sensitivity to Geophysical Fields," was held later in 1989 in Germany.

Writing on "Three Frontier Areas of Science that Challenge the Paradigm" (*Frontier Perspectives,* Vol. 3, No. 1, 1992), Beverly Rubik, for seven years director of the Center, conjectures that dowsing is related to ELF (Extremely Low Frequency electromagnetic waves). ELF waves are another major concern of the Center, especially the alleged terrible effects on human health of ELF waves bombarding us from overhead electrical wires. The other two major concerns of the Center, Rubik asserts, are alternative medicines and the nature of consciousness.

Glen Rein, in a paper on how quantum fields heal, finds that such fields, rather than electromagnetic fields, are what alter the properties of water and give it healing powers. Like other authors in this journal, Smith and Rein write in a mind-numbing technical jargon almost impossible to understand.

F. Fuller Royal and Gregory Olson discuss "Illness as a Delusion." They actually believe that illness has no reality! Illness, according to these authors, is caused by "mental delusions" in a mind that is not confined to the brain but is active in every atom of our body. Homeopathic remedies, they maintain, "are patterns of nonlinear waves that resonate with similar thought programs located in the memory field of the subconscious mind and with perturbations in the conscious mind field. These medicines are capable of eliminating delusional programs located in the memory field that serve as the foundation for illness."

Before birth, according to Royal and Olson, we existed outside of time in a region of "pure light." Time entered our lives only after we descended "into a lower earthly vibration." A developing fetus is strongly influenced by its mother's emotional state. Homeopathic drugs are "harmonic nonlinear soliton waves in resonance with subconscious negative programs . . . . The energy of homeopathic medicine will collapse a negative thought program . . . making it no longer available to enter the conscious field." Delusions can also be banished by a second "treatment modality" the authors call TFT or "Thought Field Therapy."

In 1990 the Center for Frontier Science sponsored a conference on homeopathy in Baden-Baden, Germany. Among its speakers was Jacques Benveniste, a French homeopath whose work on "water with a memory" was so thoroughly discredited a year or two earlier.[1] Nancy Kolenda writes that the conference "ended on a high note with a unanimous decision to move forward in a global cooperation in promoting homeopathic research."

The journal reports on research so far removed from reputable science that it is no wonder academic journals refuse such papers.

Beverly Rubik is also gung ho for homeopathy. Her paper on "Frontiers of Homeopathic Research" ran in the Vol. 2, No. 1, 1991, issue of *Frontier Perspectives.* Bruns, who tipped me off to this bizarre periodical, said in a letter that he heard Rubik lecture at a regional meeting of the American Association of Physics Teachers. Her stirring defense of psychic powers included an account of her experience with Russia's "magnetic women" who suspend metal objects on their foreheads and chests. Rubik showed slides of herself with a spoon stuck to her forehead! Bruns was amazed that no one in the audience laughed or snickered.

Enough about homeopathy. To regard its revival today as a frontier science is comparable to calling a revival of phrenology or palmistry a frontier science. It has been said that anyone today who believes in phrenology ought to have his or her head examined. The same can be said of today's homeopathy enthusiasts who are unable to distinguish cures from placebo effects.

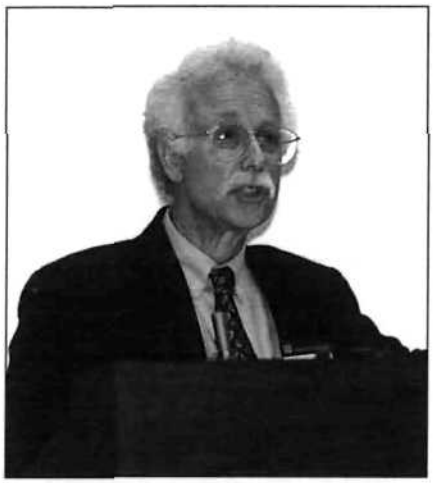
Here are a few other fields of parascience presented favorably in the Fall/Winter 1998 issue of *Frontier Perspectives:*

In "Is Dead Matter Aware of Its Environment?" Peter Graneau argues that all particles of matter are aware of all other particles regardless of how far away they are. He thinks Newton's physics is superior to Einstein's, and likens the blindness of establishment scientists today to the blindness of those Italian professors who refused to accept Galileo's experiment of dropping two different weights from the Tower of Pisa. Graneau is unaware that this experiment was never performed.

Dan Kenner, an acupuncturist, defends the thousands of herbal remedies sold in Oriental shops. He doesn't mention the shops in India where the herbs are quite different from those in China and Japan. Kenner introduces a word that was new to me—"nosology." It is not a study of noses, but the science of classifying diseases. Homeopathy, Kenner tells us, is an example of "empirical nosology"—that is, a way of classifying illnesses based on careful research.

Roger Taylor favorably reviews a self-published book—he calls it a "gem of science"—titled *Waves in Dark Matter.* The author, O. Ed Wagner, has done experiments which show that these waves, previously undetected, are responsible for what he calls the hitherto "unexplained ability" of trees to raise water up their trunks. A Chinese biophysicist, Taylor adds, has done work which suggests that these elusive W-waves play a role in the spacing of acupuncture points on human bodies. "Without doubt a new and important chapter has been opened in the science of life," Taylor concludes. Another book under review extols the great benefits of green tea in inhibiting cancer, dental caries, and other ailments.

The magazine's funniest paper is "On



David Jacobs, Temple University UFO historian (Photo by Philip J. Klass)

the Nature of Tarot," by Inna Semetsky, identified as someone at Columbia University's Teachers College. (Let's hope she's a student and not on the staff.) Semetsky defends the validity of Tarot card readings. The practitioner uses the random arrangement of the shuffled cards to tune into fields that Semetsky relates to David Bohm's "implicate order," Jung's archetypes and concept of synchronicity, Heisenberg's uncertainty principle, and karma. In addition to space's three dimensions, and the dimension of time, there is fifth dimension consisting of consciousness. Because time is a "parameter" of this fifth field, it allows Tarot readers to tap into Jung's "collective unconscious," part of the fifth field, and learn about future events. Semetsky urges the introduction of Tarot into mental health professions.

Prominent believers in ESP, PK, and precognition (some no longer living) who have been active in the center's conferences and/or contributors to its journal include Brian Josephson, Rupert Sheldrake, Andrija Puharich (author of a book about Uri Geller), Robert Jahn and his psychic assistant Brenda Dunne, Glenn Olds, Willis Harmon, Helmut Schmidt, Ramakrishna Rao, Harold Puthoff, Stephen Braude, David Griffin, Fred Wolfe, and many others.

Another piece of evidence that Temple University is sliding into absurdity involves UFOs. On their faculty as an associate professor of history is David Jacobs, one of our nation's most energetic promoters of the reality of human abductions by extraterrestrial aliens. His first book, *The UFO Controversy in America* (Indiana University Press, 1975), is an expanded version of his doctoral thesis at the University of Wisconsin. *Secret Life* (Simon and Schuster, 1992), his second UFO book, is devoted to first-hand accounts of abductions. *The Threat,* his latest book (also by Simon and Schuster) was published early this year. "Ph.D" appears after Jacobs' name on the jacket, and also after his name at the top of every left-hand page, a sure giveaway to the man's ego. His editors at Simon and Schuster obviously don't believe anything he says, but books about alien abductions sell so well to UFO enthusiasts that once-respected publishers are unable to resist the anticipated profits.

Although Jacobs has had no training in psychology, psychiatry, or hypnotherapy, he uses hypnotism to induce his patients (now more than 700) to develop strong memories of horrendous abductions even though many patients had no such memories until hypnotized. Jacobs is convinced that five million Americans have been kidnapped at least once by aliens. One female patient, who worked in retail sales, had, according to Jacobs, a hundred abductions in one year, an average of one every three days! How did she manage to keep her job, *New York Times* reviewer Joe Queenan wanted to know.

Jacobs' patients routinely report incredible sexual molestations. The aliens extract sperm from men, eggs from women, then use them to produce a race of hybrids intended soon to take over the Earth. Jacobs writes that he "desperately wishes" this not to be true, but now he "fears for the future" of his children. Jacobs isn't sure where the aliens come from, but he thinks it might be from a distant planet. They communicate with each other and with humans by telepathy. You might suppose Jacobs would look favorably on other UFO researchers using hypnosis to revive memories of abductions. Not so. For example, he regards John Mack, Harvard's embarrassing psychiatrist who also written a book about UFO abductions, as incompetent and gullible. As for Philip Klass, the nation's top debunker of the UFO mania, Jacobs refuses even to speak to him.

The hybrids who walk among us are fiendishly clever in concealing themselves. They look and dress exactly like us. To further confuse us, the aliens plant false memories in abductee heads so that when they are returned to Earth, police think they are nuts because they talk about seeing Jesus, the Virgin Mary, Abraham Lincoln, and other notables. These fake memories are created by a technique called "mindscan," a term Jacobs coined. It never occurs to him that he himself is using a form of mindscan on his patients.

"If *The Threat* has any shortcoming," wrote Joe Queenan in his *New York Times* review (January 10, 1998), "it is its failure to explain why aliens always seem to abduct people no one ever heard of . . . . Nor does he [Jacobs] inform the reader why these seemingly omnipotent creatures have never nabbed him. Perhaps Mr. Jacobs has in fact been abducted, brainwashed, and tricked into writing this book—with the specific purpose of making a reputable publisher appear inane and UFO hunters seem even more laughable."

Aside from Klass's books and newsletters, the most powerful, most hilarious recent debunking of the UFO scene is an article by Frederick Crews in *The New York Review of Books* (June 25, 1998). Titled "The Mindsnatchers," Crews reviews three UFO books, one of which is Jacobs's *The Threat.* As Crews recognizes, Jacobs, like John Mack and others, is blissfully unaware of how easily false memories can be fabricated. Fortunately, the damage these memories can do to patients is less harmful than false memories of sexual abuse by human adults. Innocent fathers, mothers, and teachers have already wasted years in prison, some even under life sentences, solely on the basis of fabricated memories of sexual abuse dramatically recounted in court by children and grownups who were brainwashed by fanatical therapists.

Crews quotes the following passage

from Jacobs's account of the memories of a patient he calls "Beverly":

> Then the hybrids told Beverly that they could take her body whenever they wanted and that she was always vulnerable and never safe. One hybrid raped her, and she was forced to perform fellatio upon another. They pinched her, twisted her skin, and hurt her without leaving marks. The pushed an unlit candle into her vagina. They then told her she had caused her children to be abducted . . . . On another occasion hybrids made her envision her six-year-old daughter walking into a room ringed with naked hybrids who had erections; she was led to believe that her daughter would be raped by all of them.

That a seemingly sane history professor could believe such obvious confabulations and keep his job at a major university is surely no small academic scandal. Temple even allows Jacobs to regularly teach a course on UFOlogy. There is one thing that can be said in praise of *Frontier Perspectives*. It has not yet published a paper by Jacobs, or, as far as I know, reviewed any of his preposterous books.

Note

1. After INSERM, France's medical research agency, closed down Benveniste's laboratory, he opened his own Digital Biological Laboratory south of Paris. He recently claimed to have transmitted "water memory" over the Internet, using e-mail. And he is suing two Nobel prize winners, physicist Georges Charpak and biologist François Jacob, and physicist Claude Hennion, for writing unkind things about him. On Benveniste's monumentally flawed homeopathic research, see Chapter 4 of my *On the Wild Side* (Prometheus, 1992). □

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Alien Implants: The New 'Hard Evidence'

Science fiction author Whitley Strieber continues to promote the notion of extraterrestrial visitations. His *Communion: A True Story* (1987) told of his own close encounter—actually what psychologist Robert A. Baker has diagnosed as "a classic, textbook description of a hypnopompic hallucination" (or "waking dream") (Baker and Nickell 1992). Now, several money-making books later, Strieber offers *Confirmation: The Hard Evidence of Aliens Among Us.* The evidence is threefold: UFO sightings *(yawn)*, close encounters *(been there, done that)*, and—the hard evidence, quite literally—alien implants!

Implants are the latest rage in UFO circles, and Strieber marshals the diagnostic, radiographic, surgical, photographic, and analytic evidence that supposedly indicates—but admittedly does not prove—extraterrestrials are implanting devices in human beings. To put Strieber's claims into perspective, we should first look at the development of the implant concept.

The notion of induced mind/body control is pervasive, with paranormal entities typically having some means of monitoring mortals as a prelude to control. Examples range from mythological beings—like Cupid, whose magical arrows infected men's hearts with love, and Morpheus, who formed sleepers' dreams—to superstitious belief in angelic guidance, demonic possession, Voodoo hexes, and zombie slaves. Folklore told of abductions to fairyland from which people returned with addled wits or sapped vitality. Popular literature brought such examples as Bram Stoker's *Dracula* (1891) and the mesmerizing Svengali in George du Maurier's *Trilby* (1894). Science fiction helped develop the alien-takeover concept, with such movies as *The Invasion of the Body Snatchers* (1956). A 1967 *Star Trek* TV episode, "Errand of Mercy," featured a "mind-sifter," a device used by the alien Klingons to probe prisoners' thoughts during interrogations (Okuda and Okuda 1997).

Meanwhile, Kenneth Arnold's 1947 "flying saucer" report touched off the modern era of UFOs and with it an evolving mythology. By the 1950s "contactees" were claiming to receive messages from the Space People. Then in 1961 came the first widely publicized abduction case, that of Betty and Barney Hill. (Their psychiatrist concluded the couple had shared their dreams rather than having had an actual experience [Klass 1974]).

With the publicizing of the Hill case—notably by John G. Fuller's *The Interrupted Journey* in 1966 and NBC television's prime-time movie "The UFO Incident" in 1975—claims of alien abductions and "medical" examinations began to proliferate. So did another phenomenon, the abduction guru: a self-styled alien researcher and often amateur hypnotist who elicits fantasy abduction tales from suitably imaginative individuals (Baker and Nickell 1992, p. 203).

Reports of alien implants may have begun with the alleged abduction of a Massachusetts woman, Betty Andreasson, which supposedly took place in early 1967. However, the case was not publicized widely until 1979 when Raymond E. Fowler published his book *The Andreasson Affair.* Andreasson, who seems to have had a predisposition to fantasize under hypnosis, claimed the aliens had removed an apparently implanted device, in the form of a spiked ball, by inserting a needle up her nose. Fowler speculated that the BB-size implant could have been "a monitoring device" (Fowler 1979, p. 191). About this time, the concept of "psychotronic technology"—i.e., mind control by means of physical devices—entered UFOlogy (Sachs 1980, pp. 200, 262).

Andreasson's abduction report was followed by that of a Canadian woman named Dorothy Wallis. She described a similar implant under hypnosis, which seemed to explain an earlier "compulsion" to meet with the aliens (Klass 1989, p. 122). When we appeared together on the Canadian television talk show program *The Shirley Show* (which aired April 15, 1993), I suggested that Mrs. Wallis's story appeared to imitate Andreasson's. She countered that her

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abduction came first, but I observed that she did not come forward until about 1983 and that Andreasson's much earlier publication gave the latter the stronger claim (Nickell 1995; Wray 1993).

In time, David Jacobs, a historian-turned-abduction-researcher, found the Andreasson/Wallis-type implant to be stereotypical among abductee claimants.

> The object is as small as or smaller than a BB, and it is usually smooth, or has small spikes sticking out of it, or has holes in it. The function of this device is unknown: It might be a locator so that the targeted individual can be found and abducted; it might serve as a monitor of hormonal changes; it might facilitate the molecular changes needed for transport and entrance; it might facilitate communication . . . Sometimes nosebleeds occur after this procedure. Both child and adult abductees have seen physicians for nosebleed problems, and have discovered *odd holes inside their noses.* [Jacobs 1992, pp. 95–96]

Alas, Jacobs relates,

> Several abductees have reported that a ball-shaped object either dropped out of their nose or was expelled when they blew their nose. All of these *expulsions happened before they* knew they had been abducted; in each case they thought they had inexplicably inhaled something and discarded the object or lost it. [p.96]

Actually, one of these items did survive and was thoroughly investigated by the Center for UFO Studies (CUFOS) in the late 1980s. Possessed by a self-claimed abductee, the "implant" had supposedly been stuck up the man's nostril by his extraterrestrial abductors, but was later dislodged when he caught a cold and blew his nose. CUFOS investigator Don Schmitt accompanied UFO historian Jerome Clark, editor of CUFOS's journal *International UFO Reporter,* to meet the man in an Illinois restaurant. As Clark relates the incident, after brief exchanges, the man unwrapped the object. "Don and I stared at it incredulously. *It was a ball bearing."Despite the obvious identification,* the CUFOS team sought the man's X-rays, which "showed nothing out of the ordinary," Clark states. Nevertheless, CUFOS went on to have the alleged implant scientifically examined, whereupon it proved to be "an utterly ordinary terrestrial artifact" (Clark 1992).

In contrast to Jacobs's similar-but-generally-unavailable brain/nasal implants are the current devices. The change in the situation is remarkable. Since 1994 alleged implants have been surgically recovered but they've become notably diverse: one looks like a shard of glass, another a "triangular" (or possibly "star-shaped") piece of metal, still another a carbon fiber, and so on. None was located in the brain or nasal cavity, instead being recovered from such extremities as toe, hand, shin, external ear, etc.; some were accompanied by scars while others were not (Linderman 1998; Strieber 1998, pp. 171–247).

Indeed, so varied are the implants, their sites, and other characteristics that they recall a similar craze of yore. *During the witch mania of the sixteenth* and seventeenth centuries, inquisitors identified certain "witch's marks" which could be almost anything. As one writer explains, "Papillomas, hemangiomas, blemishes, warts, welts, and common moles were seized upon as authentic witch's marks, and these marks invariably determined the destiny of the suspect" (Rachleff 1971).

Several disparate implants are described in the bestselling *Abduction: Human Encounters with Aliens* by Harvard psychiatrist John E. Mack. For example, two small nodules that appeared on an abductee's wrist were surgically removed and analyzed in a pathology laboratory. The lab found the tissue unremarkable (Mack 1994, pp. 27–28). Another implant was supposedly placed at the base of an abductee's skull. Under hypnosis the man—who believes he has an alternate identity as a humanoid named Orion—described a small, pill-shaped object with protruding wires that, he said, would make it easier for the aliens "to follow me." Astonishingly, Mack makes no mention of any subsequent attempt to locate and remove the *reported implant (Mack 1994, p. 172).*

Many of the removals have been performed by "California surgeon" Roger Leir. Actually Dr. Leir is not a physician, but a podiatrist (licensed to do minor surgery on feet). He was accompanied by an unidentified general surgeon (who did not want to be associated with UFO abduction claims). The latter performed all of the above-the-ankle surgeries.

A critic of implant claims, Dr. Virgil Priscu, a department head in an Israeli teaching hospital, observes that a foreign object can enter the body unnoticed, as during a fall, or while running barefoot in sand or grass—even as a splinter from a larger impacting object (Priscu 1998). Such foreign objects may become surrounded by a membrane, like several of the "implants" removed by Dr. Leir et *al. (Lindemann 1998);* depending on the material, they may also degrade over time, leaving only a small bit of "reaction" tissue in place of the foreign object—"No mystery, no 'implants,'" says Dr. Priscu. He challenged Dr. Leir's associate, a hypnotherapist named *Derrel Sims, to provide specimens, or at* least color slides of them, for analysis at a forensic medical institute, but reported he received no cooperation. Dr. Priscu also noted the lack of the scientific peer-review process in the case of implant claims. Although he is himself an admitted UFO believer, he states, "I also firmly believe that meticulous research by competent persons is the way to the truth" (Priscu 1998).

In *Confirmation* Whitley Strieber describes several of the implants including one removed from his own external ear by a physician. It turned out to be collagen, the substance from which cartilage is formed (Strieber 1998, p. 228). Strieber admits that the promised "hard evidence" provided by implants is not so hard after all: "I hope this book will not cause a rush to judgement," he writes, "with skeptics trying to prove that evidence so far retrieved is worthless while UFO believers conclude that it is proof. Both approaches are a waste of time, because the conclusive evidence has not yet been gathered" (Strieber 1998, p. 255).

A similar admission comes from UFOlogist David E. Pritchard, an M.I.T. *physicist who, with Mack, hosted the* 1992 Abduction Study Conference at M.I.T. (Pritchard emphasized that the conference was merely held there; it was *not an M.I.T. conference.)* Pritchard gave a

presentation on a suspected implant, a tiny object with a collagen sheen that he acknowledged might have grown in the alleged abductee. (It had supposedly been implanted in the man's penis, but worked itself out over time.) Pritchard conceded:

> I don't have anything conclusive. What I have is just what you usually get in this business: it will provide more beliefs for the believers and will be instantly skeptified by the skeptics, and it's not very good evidence if it won't move the lines at all. The point is to convince the jury . . . (Bryan 1995, pp. 50–51)

Of course, it is not skeptics but implant advocates who have the burden of proof—a burden they have emphatically failed to meet. Indeed, the implant concept—like the larger alien abduction phenomenon itself—lacks proof that it has an objective reality. Instead, the evidence indicates it is simply part of an evolving UFO mythology. Its theme of entities exerting influence over humans is one seen in many variants, ranging from ancient mythical lore to modern science fiction and persisting in some form in popular culture. There have always been individuals—fantasizers as well as paranoid schizophrenics—who have heard voices that directed or controlled them, voices that are expressions of hopes and fears. Therefore it seems safe to predict that, as the millennium draws near, there will be further claims of "hard evidence" of extraterrestrial visitation. We may also expect that misperceptions and exaggerations of natural phenomena, as well as hoaxes, will abound.

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Auch im deutschen Sprachraum gibt es ein Magazin, das sich kritisch mit außergewöhnlichen Behauptungen auseinandersetzt. Als Zeitschrift für Wissenschaft und kritisches Denken hinterfragt der *Skeptiker* den Wahrheitsgehalt solcher Thesen kritisch, undogmatisch und mit wissenschaftlichen Methoden. Er analysiert die Hintergründe paranormaler Überzeugungssysteme und weist auf möglicherweise problematische Konsequenzen von solchen Vorstellungen hin. Herausgeber ist die Gesellschaft zur wissenschaftlichen Untersuchung von Parawissenschaften (GWUP), die sich um die Verbreitung sachlicher, möglichst unvoreingenommener, sorgfältiger und fundierter Untersuchungen bemüht. Fordern Sie noch heute Ihr kostenloses Probeexemplar an! Sie können auch Mitglied in der GWUP werden, um deren Ziele zu unterstützen.

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Apocalypse Foiled Again; UFOlogists Shoot for the Moon

As you might have heard, approximately 150 members of a Taiwanese UFO cult called Chen Tao ("Perfect Way") came to the U.S. in 1996 expecting to meet God, who they said would arrive in a flying saucer. They first settled in San Dimas, California, a state where cults seem almost normal. Then suddenly they moved to Garland, Texas, the sort of town where a large crowd of foreign-speaking cult weirdos would not exactly pass unnoticed. A group of homeowners in Garland wrote the mayor and City Council complaining that this bizarre group was ruining their neighborhood. The mayor replied that these people were simply exercising their rights to free speech, and there wasn't anything he could do. However, what he should have replied was, "Don't worry, these people won't bother you for long. They say they're going to be carried away on flying saucers on the morning of March 31." For according to the group's leader, Hon-Ming Chen, God was going to arrive at his house on that date at 10 A.M. Central Time with a whole fleet of flying saucers, swooping all of them up from the earth to rescue them from the coming Great Tribulation. Authorities, suspecting that the saucer fleet might not materialize, feared another mass-suicide like the Heavens Gate UFO cult last year, especially since many members carried neatly-packed backpacks with identical white clothing and sneakers for their anticipated heavenly rendezvous. The Taiwanese media had been reporting that Chen was encouraging newcomers to kill themselves so their bodies could be picked up by flying saucers. However, the church members denied having any thoughts of suicide.

Large numbers of reporters, in addition to Chen's followers, gathered at the appointed place and time but, alas, nothing happened. Chen had an explanation: God had already arrived, invisibly, and entered their souls. As soon as things quieted down a bit, Chen announced that God would not be gathering people up from Texas after all, but instead from the area of the Great Lakes. He and a small group of the faithful set off for Buffalo, New York. Many of the others returned to Taiwan. While in New York, Chen had a vision of the numbers seventeen and eighteen, which he interpreted as a divine instruction to move his followers to the town of Olcott, where those two numbered road routes intersect. Should anyone care about Chen's remaining prognostications, he sees Armageddon occurring in August of next year. Of course, with the year 2000 fast approaching, if the Apocalypse *does* begin, the doomsayers will be lined up for blocks trying to get credit for the prediction. (For more information on the Chen Tao cult, see http://www.cesnur.org).

If you're convinced that the truth is out there—and that "out there" means "on the moon," you might want to contribute to Citizens Against UFO Secrecy (CAUS), a group that has been filing UFO-related Freedom of Information Act requests for many years. The April issue of their newsletter states that "CAUS, in conjunction with Trans Lunar Research, is working on a project to send a privately funded rocket to the Moon to transmit live photos from the Sinus Medii region to verify the alleged artificial structures located there." Some UFOlogists claim to discern, in NASA photos of that region, "lunar bridges spanning vast chasms, towering structures protruding from large craters—and UFOs rising from the surface of the moon." If you've never heard of Trans Lunar Research, that isn't surprising, unless you're a fan of Art Bell's late-night, high-weirdness talk show, where they've been featured several times. The group says they've been launching small rockets in the Mojave desert, and they certainly have big plans: their aim is to establish a fifty-member lunar base, with the first inhabitants to land in 2005. While these plans are impressive, the group itself would be much more credible if it had nothing whatsoever to do with Art Bell, or with UFOs.

CAUS estimates the cost of the unmanned lunar reconnaissance at $12

Robert Sheaffer's World Wide Web page for UFOs and other skeptical subjects is at http://debunker.com/~sheaffer/ufo.html.

million. For that sum, they hope to be able to "verify, through photographic evidence, the existence or non-existence of alleged ancient artificial artifacts in the Sinus Medii region" (apparently they expect some natural artifacts might be photographed as well). Another goal of the mission is "to confirm previous moon landings," about which many UFOlogists have their doubts, particularly those who call in to Art Bell. What CAUS doesn't realize is that even if they succeed in photographing Apollo lunar landing sites, Art Bell would soon feature guests claiming that *their* photos had been faked.

CAUS is also keenly interested in the Cydonia region of Mars, where many UFOlogists believe that a supposed stone "face" and alleged "pyramids" were recently re-imaged during NASA's Global Surveyor mission. CAUS notes that Dr. Mark Carlotto, who formerly was suggesting that the region called "the City" may contain artificial structures, after studying the recent images, now says that the features appear to be natural formations. But Richard Hoagland, the biggest booster for the Face on Mars, isn't giving up so easily. Hoagland insists that the new photos reveal that the entire Cydonia region is made of glass. Hoagland further suggests on his Web site (http://www.enterprisemission.com) that a certain mottled image may actually reveal a "Leavitttown on Mars" (referring to an early U.S. housing development noted for its nearly-identical, low-cost houses). Hoagland also finds in the new Martian images a "Castle of Barsoom." (For more on the Face on Mars, see David Morrison, "Mars Surveyor Photographs The Face on Mars," July/August *SI*.)

But why do UFOlogists think that they need to go to the moon, or even Mars, for evidence of extraterrestrials, when it would appear that the desert Southwest of the United States is littered with saucer wreckage? Observers of the UFO scene know that Roswell is far from the only place that UFOs are alleged to have crashed. The UFO group CSETI lists on its Web page (http://www.cseti.com) 193 possible UFO crashes worldwide since prehistoric times. In the U.S. alone, saucers have allegedly fallen from the skies near Kingman, Arizona; Las Vegas, Nevada; Aztec, New Mexico; Laredo, Texas; Death Valley, California; and Paradise Valley, Arizona, to name just a few, not to mention a second crash at Roswell two years after the famous one. For unknown reasons, there seems to be proportionately fewer UFO crash reports from the populous eastern states. Perhaps there exists a deadly Arid Southwest Triangle with some mysterious force in a that pulls saucers downward. We did report one case of a UFO that allegedly crashed on Long Island, New York (SKEPTICAL INQUIRER Fall, 1993). We further reported how the UFOlogists promoting this claim, led by John Ford of the Long Island UFO Network (LIUFON), were arrested in a bizarre plot to attempt to murder local government officials who they held responsible for the alleged cover-up. The plan was to poison them by putting radium in their food, their cars, and even in their toothpaste (SKEPTICAL INQUIRER Jan/Feb., 1997). Recently Ford was found mentally unfit to stand trial, and was sent to a mental institution. However, some UFOlogists still insist that Ford was framed in a cover-up, and that his arrest, intended to intimidate those who might pry into UFO secrets, illustrates the depths to which the authorities will go to keep the subject under wraps (See the Web site of the John Ford Defense Committee at http://www.iwaynet.net/-pic).

What Citizens Against UFO Secrecy doesn't realize is that even if they succeed in photographing Apollo lunar landing sites, Art Bell would soon feature guests claiming that *their* photos had been faked.

Since aliens have been such good business for Roswell, which last year recorded 192,000 visitors to its UFO Museum, the good folks in Aztec, New Mexico were wondering how they might tap into the extraterrestrial cash cow. The *Albuquerque Journal* reported on April 19 that that town was planning a "50th Anniversary Celebration" on May 25 to commemorate the date of its own supposed UFO crash in 1948 (although the crash date is also variously given as February 13, or March 25, not that it matters). Aztec, like Roswell, boasts an alleged crash site, although unlike Roswell it claims only one. There isn't a great deal to be seen there except for an ugly concrete mass whose origin nobody can explain. (Somehow I can't imagine that a book titled *Slag Heap of the Gods* might become a best-seller, but I could be wrong). Right now there are only seventy-five rooms at four motels in Aztec (Las Vegas it ain't), but that will certainly change if the UFO crash story takes off. (For more information on the Aztec crash, see News and Comment section, page 12, this issue. See also "Saucer Shorts" in the News and Comment section of the July/August issue.)

The only problem with the Aztec crash story is that it has even less substance than the Roswell incident, which at least involved the recovery of the remnants of a classified spy-balloon project. The Aztec incident seems to have been simply made up in the 1950 book *Behind the Flying Saucers* by Frank Sculley. The "crashed saucer" story in that book has since been shown, to the satisfaction of almost everyone, to have been a complete fabrication. Sculley's informants were two con-men who were convicted of various swindles but were somehow clever enough to stay out of jail. The "Aztec crash" story was picked up again in the 1970s by Robert S. Carr, who claimed to be a professor and always called himself "Dr. Carr," even though he had never attended college. Carr's son Tim has recently written an article exposing the tall tales of his late father (SKEPTICAL INQUIRER, July/August 1997), but no one in Aztec seems to care. And if Aztec does succeed in joining Roswell as a UFO tourist destination, can the other towns be far behind? ☐

Coincidences: Remarkable or Random?

Most improbable coincidences likely result from play of random events. The very nature of randomness assures that combing random data will yield some pattern.

BRUCE MARTIN

"You don't believe in telepathy?" My friend, a sober professional, looked askance. "Do you?" I replied. "Of course. So many times I've been out for the evening and suddenly became worried about the kids. Upon calling home, I've learned one is sick, hurt himself, or having nightmares. How else can you explain it?"

Such episodes have happened to us all and it's common to hear the words, "It couldn't be just coincidence." Today the explanation many people reach for involves mental telepathy or psychic stirrings. But should we leap so readily into the arms of a mystic realm? Could such events result from coincidence after all?

There are two features of coincidences not well known among the public. First, we tend to overlook the powerful reinforcement of coincidences, both waking and in dreams,

in our memories. Non-coincidental events do not register in our memories with nearly the same intensity. Second, we fail to realize the extent to which highly improbable events occur daily to everyone. It is not possible to estimate all the probabilities of many paired events that occur in our daily lives. We often tend to assign coincidences a lesser probability than they deserve.

However, it is possible to calculate the probabilities of some seemingly improbable events with precision. These examples provide clues as to how our expectations fail to agree with reality.

Coincident Birthdates

In a random selection of twenty-three persons there is a 50 percent chance that at least two of them celebrate the same birthdate. Who has not been surprised at learning this for the first time? The calculation is straightforward. First find the probability that everyone in a group of people have different birthdates (X) and then subtract this fraction from one to obtain the probability of at least one common birthdate in the group (P), $P = 1 - X$. Probabilities range from 0 to 1, or may be expressed as 0 to 100%. For no coincident birthdates a second person has a choice of 364 days, a third person 363 days, and the nth person $366 - n$ days. So the probability for all different birthdates becomes

$$\text{For two people: } X_2 = \frac{365}{365}\cdot\frac{364}{365}$$

$$\text{For three people: } X_3 = \frac{365}{365}\cdot\frac{364}{365}\cdot\frac{363}{365}$$

$$\text{For } n \text{ people: } Xn = \frac{365}{365}\cdot\frac{364}{365}\cdot\frac{363}{365}\cdots\frac{366-n}{365} = \frac{365!}{(365-n)!\,365^n}$$

With its factorials the last equality is not especially useful unless one possesses the capability of handling very large numbers. It is instructive to use a spreadsheet or a loop in a computer language to calculate Xn from the first equality for successive values of n. When $n = 23$, one finds $X = 0.493$ and $P = 0.507$. A plot of the probability of at least one common birthdate, P, versus the number of people, n, appears as the right hand curve of circles in Figure 1. The curve shows that the probability of at least two people sharing a common birthdate rises slowly, at first passing just less than 12% probability with ten people, rising through 50% probability at the open circle corresponding to twenty-three people, then flattening out and reaching 90% probability in a group of forty-one people. This means that on the average, out of ten random groups of forty-one persons, in nine of them at least two persons will celebrate identical birthdates. No mysterious forces are needed to explain this coincidence.

Note that the probability of coincident birthdays for $2\times23=46$ people is not 100%, as some might suppose, but 95% as shown by the right-hand curve in Figure 1. Extension of the curve beyond the limit of Figure 1 reveals that fifty-seven people produce a 99% probability of coincident birthdays.

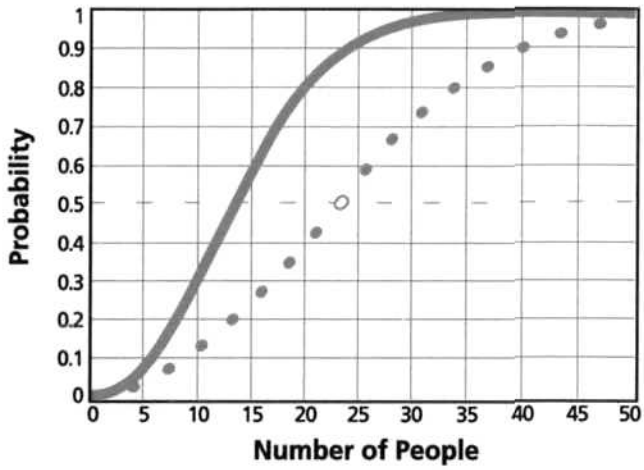

Figure 1. **Probabilities of Coincident Birthdates:** The right-hand curve of circles represents the probability that in a random group of people at least two celebrate the same birthdate. As indicated by the open circle just above the horizontal line at 0.50 probability, an even 50% chance is achieved at just 23 people. The left-hand curve represents the probability that in a random group of people at least two share a birthdate within one day of each other. The 50% chance for this three-day coincidence occurs with just 14 people.

The same principle may be used to calculate the probability that at least two people in a random group possess birthdates within one day (same and two adjacent days). This condition is less restrictive than the former, and 50% probability is passed with just fourteen people. The left-hand curve in Figure 1 shows a plot for the probabilities of within-one-day birthdates.

Delving a little deeper into some aspects of the probabilities of identical birthdates provides additional insight. Note that we said several times "at least two people" sharing a common birthdate. As the group size increases the chances for multiple coincidences also increase. The descending curve at the left of Figure 2 represents the probability of no coincidences (NC) of birthdates, identical to the Xn values calculated above. The first curve with a maximum plots the probability of only one pair ($1P$) sharing an identical birthdate. The maximum occurs at twenty-eight people with a probability of almost 0.39. As the group becomes larger the probability of other coincidences increases as well. The second curve with a maximum represents the probability of exactly two pairs ($2P$) sharing an identical birthdate. Its maximum occurs at thirty-nine people with a probability of 0.28. The last, rising curve in Figure 2 plots the total probabilities of all remaining coincidences ($>2P$), consisting of three pairs, triplets, etc. For all numbers of people, the probabilities of all four curves total 1.00.

Figure 2 shows that for twenty-three people the probabilities are 0.36 for one pair, 0.11 for two pairs, and 0.03 for the total of all other coincidences for a probability sum of 0.50. We have

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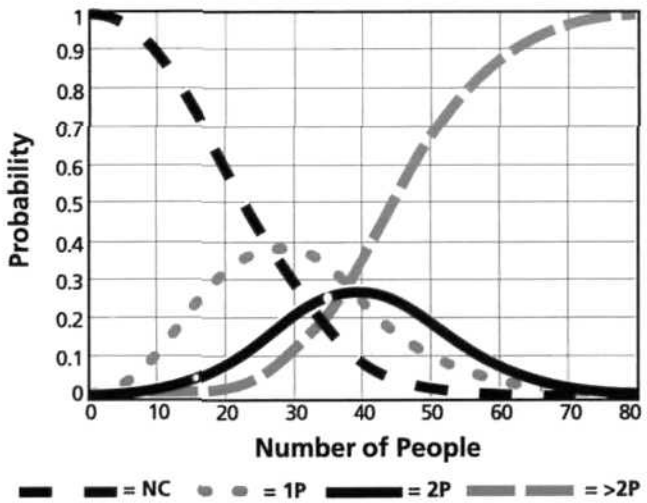

Figure 2. **Probabilities of Multiple Coincident Birthdates:** The descending curve at the left represents the probability for no shared birthdates, no coincidences (NC). The first curve with a maximum plots the probability of only one pair (1P) with an identical birthdate. The second curve with a maximum represents the probability of exactly two pairs (2P) sharing identical birthdates (different date for each pair). The ascending curve at the right plots the probability of all other coincidences (>2P), three pairs, triplet, etc. For any number of people the probabilities of the four curves total 1.00.

broken down the 0.50 probability for at least one coincidence discussed above for twenty-three people into component contributions. For twenty-three people the probability of no coincidences is also 0.50, as shown in the descending curve (NC) of Figure 2. There is an almost triple intersection at thirty-eight people where the chance of 1 identical pair, 2 identical pairs, and the total of all other coincidences is 28-29%. For thirty-eight or more people the total of all other coincidences becomes greater than the exactly one and two pair possibilities, and passes through 50% chance at forty-five people. In a random group of more than forty-five people there is a better than even chance that there are more than two coincidental birthdates.

What this series of calculations boils down to is this: If coincident birthdates are so much more common than we would have guessed, isn't it likely that many of those other striking coincidences in our lives are the outcome of probability as well? We should not multiply hypotheses: the principle of Occam's Razor states that the simplest explanation is to be preferred.

Presidential Coincidences

Consider the birth and death dates of American presidents to see how this reasoning works in real cases. There have been forty-one presidential births, and Figure 1 indicates a 90% probability that at least two presidents should have been born on the same day. There is one such coincidence: James K. Polk and Warren G. Harding were both born on November 2. The result appears in Table 1. With forty-one cases there is a 66% chance of a second coincidence, but none has yet occurred. [The result may be obtained by adding the probabilities for forty-one persons for the $2P$ (0.28) and $>2P$ (0.38) curves of Figure 2.] Perhaps the next president's birthdate will coincide with one of the previous forty-one. (The birthdates of neither Albert Gore nor Colin Powell do so.)

Table 1

Presidential Coincidences

Births, 41 cases (90%)	
November 2	James K. Polk Warren G. Harding
Deaths, 36 cases (83%)	
March 8	Millard Fillmore William Howard Taft
July 4	John Adams Thomas Jefferson James Monroe

Of the thirty-six dead presidents Figure 1 indicates an 83% probability that at least two should have died on the same date. The results also appear in Table 1. Both Millard Fillmore and William Howard Taft died on March 8. With 36 cases there is a 51% chance of a second coincidence.

In what seems an astounding coincidence, three early presidents died on July 4, as listed in Table 1. Both John Adams and Thomas Jefferson died in the same year, 1826, on the fiftieth anniversary of their signing the Declaration of Independence. Adams's final words, that his long-time rival and correspondent Jefferson "still lives," were mistaken, as Jefferson had died earlier that same day. James Monroe died on the same date five years later. Presidential scholars suggest that the former early presidents made an effort to hang on till July 4. James Madison rejected stimulants that might have prolonged his life, and he died six days earlier on June 28 (in 1836). It seems evident that for the deaths of several presidents July 4 is not a random date. Only one president, Calvin Coolidge, was born on July 4.

An important point in all of the preceding is that no birthdate was specified in advance. Table 2 lists the crowd sizes for 50% probabilities. The first entry restates what we already know: a group of twenty-three suffices for at least two to possess the same unspecified birthdate. If we specify a particular birthdate, such as today, a crowd of 253 people is required to have an even chance for even one person with that birthdate.

Table 2

Crowd Size for 50% Probabilities

At least two have the same, unspecified birthday	23
At least one has the specified birthday	253
At least two have the same, specified birthday	613

For at least two persons to possess a specified birthdate, the 50% probability is not reached until there is a mob of 613 people. This huge difference of twenty-three versus 613 for 50% probability of at least two persons with a common birthdate is due to the fact that the date is *un*specified for the group and specified for the mob. *That some improbable event will occur is likely; that a particular one will occur is unlikely.* If we look at our personal coincidences, we see that they were rarely predicted in advance.

Abraham Lincoln and John Kennedy

It is always possible to comb random data to find some regularities. A well-known qualitative example is the comparison of coincidences in the lives of Abraham Lincoln and John Kennedy, two presidents with seven letters in their last names, and elected to office 100 years apart, 1860 and 1960. Both were assassinated on Friday in the presence of their wives, Lincoln in Ford's theater and Kennedy in an automobile made by the Ford motor company. Both assassins went by three names: John Wilkes Booth and Lee Harvey Oswald, with fifteen letters in each complete name. Oswald shot Kennedy from a warehouse and fled to a theater, and Booth shot Lincoln in a theater and fled to a barn (a kind of warehouse). Both succeeding vice-presidents were southern Democrats and former senators named Johnson (Andrew and Lyndon), with thirteen letters in their names and born 100 years apart, 1808 and 1908.

But if we compare other relevant attributes we fail to find coincidences. Lincoln and Kennedy were born and died in different months, dates, and states, and neither date is 100 years apart. Their ages at death were different, as were the names of their wives. Of course, had any of these features corresponded for the two presidents, it would have been included in the list of "mysterious" coincidences. For any two people with reasonably eventful lives it is possible to find coincidences between them. Two people meeting at a party often find some striking coincidence between them, but what it is—birthdate, hometown, etc.—is not predicted in advance

Bridge Hands

In the card game bridge there are a possible 635,013,559,600 different thirteen-card hands. This number of hands could be realized if all the people in the world played bridge for a day. For an individual it would take several million years of continuous playing to be dealt each of these hands. Yet any given hand held by a player is equally probable, or rather, equally *improbable,* as its probability is 1/635,013,559,600 or a little better than one part in a million million. Any hand is just as improbable as thirteen spades. Bridge hands are an example of the daily occurrence of very improbable events, but of course, the hands are not specified in advance.

Consider a group of just 10 or more students in a classroom of a college that draws students from several states. During school session, numerous such classrooms exist each day. Yet the odds against predicting the exact make up of any classroom ten years in advance (all the students and teacher born by then) are truly astronomical. This is another example of the daily occurrence of highly improbable events.

Runs of Heads and Tails

What sequence of head(H) and tails(T) might you expect in random tossing of a coin? Not all heads nor all tails, nor even the alternating sequence (HTHTHTHT), as this series is obviously regular and not random. In a random sequence we expect runs of both heads and tails. We can simulate progressions of coin tosses from a random sequence of numbers.

So far as is known, the decimal digits of the irrational number π, which multiplies the diameter of a circle to obtain the circumference, are random. This does not mean that every time π is calculated a different result is obtained, but rather that the value of any single digit is not predictable from preceding digits. An example of a pattern leading to predictability is the sequence of decimal digits in the fraction 1/7 = 0.142857142857142857. . . , where there is an obvious repeat every six digits.

The decimal digits of π have been calculated to hundreds of millions of digits by high-speed computers, but we list only the first 100 digits in four rows of 25 digits.

3.14159265358979323846264
33832795028841971693993751
05820974944592307816406286
20899862803482534211706 79

There are fifty-one even digits and forty-nine odd digits. There is an almost an even distribution when the first 100 decimal digits are divided in another way: forty-nine digits from 0 to 4 and fifty-one digits from 5 to 9.

Since the decimal digits of π are random, we may simulate a random sequence of heads and tails in coin tossing by assigning even digits to heads and odd digits to tails. The sequence of heads and tails in 100 tosses with 25 tosses per line becomes

THTTTHHTTTHTTTTHTHHHHHHT
THTHTTTHHHHHTTTTHTTTTTTT
THTHHHTTHTHHTTHTHTHTHHHHHH
HHHHTTHHHHHTHHHTTHHTTTHHTT

Combing the random sequence we find some regularities, such as the alternating sequence of eight tosses from 62–69 (underlined). The probability of an alternating sequence of 8 tosses is once in $2^7 = 128$ tosses. There are some long runs of all heads and all tails. There are two runs of 5 heads, one run of 6 heads, one run of 8 tails, and a surprising run of 10 heads. The π decimal digits 69–78 are all even (refer to underlined digits).

A run of ten even digits should occur only once in 2^{10} = 1,024 digits. Yet such a run occurs within the first eighty digits.

So what have we here? A proof that the decimal digits of π are not random? No, what we have instead is a demonstration of how it is always possible to comb random data and find regularities not specified in advance. Since ten even digits occur within the first 100 decimal digits of π, we might (mistakenly) think we are on to something, and that such a run might occur frequently. In fact a run of ten even digits does not occur again in the first 1,000 decimal digits of π. In the first 1,000 digits a single run of ten odd digits occurs from 411–420.

The point is that the very nature of randomness assures that combing random data will yield some pattern. But what that pattern is cannot be specified in advance. If someone finds a pattern combing random data, he or she may use it as a hypothesis for investigation of more data but should never make a general conclusion from it. In our example we discovered (but did not predict) ten even digits within the first 100 digits but not again in the next 900 digits. For confirmation of a trend, the target data must be stated in advance of data inspection. If an unexpected pattern does emerge during inspection after the data is obtained, the pattern can be used as a hypothesis for obtaining and inspecting an entirely new set of data.

The heads and tails sequence may be applied in other ways. Consider a football quarterback who completes 50% of his passes or a basketball player who makes 50% of his or her free throws. Assign heads (H) to a pass completion or made free throw and tails (T) to a miss, and then one expects long runs of completions and misses as shown in the HT sequence above. Most hot and cold streaks in sports are just the consequence of randomness. The "hot hand" is most often an illusion of significance that appears in data sets that are random.

We may utilize the random sequence of π decimal digits to find likely streaks for a .300 hitter in baseball. For example, assign the digits 0, 2, and 4 to hits and the other seven digits to outs. Then, out of the first 100 decimal digits there are 30 hits and 70 outs. If we divide the sequence of 100 digits into successive groups of four, a representative number of bats per game, we obtain the results for twenty-five games. Our .300 hitter then goes hitless in four games (three in succession for a "slump"), strokes one hit in thirteen games, two hits in seven games, three hits in one game, and has no game in which he gets four hits. Astonishingly, the batter gets at least one hit in the last thirteen games, considered enough to be a real "streak." But this "streak" arises out of the random sequence of π decimal digits. A batter's slump or hitting streak is likely just the result of randomness in play.

Clearly, unspecified improbable coincidences occur daily to everyone, and these coincidences are most likely the result of randomness. If the data set is large enough, coincidences are sure to appear, as demonstrated with the first 100 decimal digits of π. The chance of tossing five straight heads is only 3 percent, but for 100 tosses the chance becomes 96 percent.

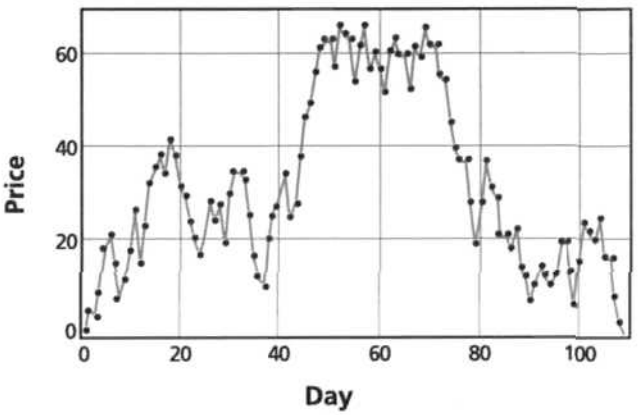

Figure 3. **Stock Market Simulation:** Daily stock market action presented as price for 109 trading days generated from the random decimal digits of π. The representative "head and shoulders top" is shown to be consistent with random play of the market. Of course, the number of days is flexible, one decimal digit may represent any fraction or number of days. See Note for a description of how the price action was generated.

Though applied in a different context, Ramsey theory (*Scientific American*, July 1990) states that "Every large set of numbers, points, or objects necessarily contains a highly regular pattern." It is not necessary to posit mysterious forces to explain coincidences.

Random Prices in the Stock Market

Given the current fascination with the long bull market in stocks, we can generate an even more interesting result from the random decimal digits of π. Let us plot on the *x*-axis the number of the decimal digit and on the *y*-axis a price value that is generated from the decimal digits as described in the Figure 3 caption and Note so that there is an arbitrary and equal balance between the up and down directions for price. For the first 108 decimal digits of π the entire plot is in positive territory. Starting at zero the plot works its way haltingly to increasingly positive values, attaining a plateau from the 48–71 decimal digits before it begins to work its way down, almost returning to zero on the 99th digit, and crossing into negative territory after the 108th decimal digit. To a stock market technician this plot represents a head and shoulders top in a plot of a stock price or stock market price versus time. It is all there in Figure 3, a top and shoulders on both sides of the top. Yet this plot was generated from the first 109 random decimal digits of π! The maximum value of 65 on the *y*-axis is reached three times in the plateau region and is more than 7 times greater than the maximum single move of 9. Therefore, we may conclude that a head and shoulders top in stock or commodity prices may represent nothing more than random play in the markets. (Over the longer term there is a rising trend in stock market averages.)

A recent sweepstakes received in the mail offered a grand prize of $5,000,000. The fine print stated the chances of winning this prize as one in 200,000,000. Out of this large popu-

CSICOP Presidential Coincidences Contest

Back in 1992, the SKEPTICAL INQUIRER held a Spooky Presidential Coincidences Contest, in response to Ann Landers printing "for the zillionth time" a list of chilling parallels between John F. Kennedy and Abraham Lincoln. The task was for readers to come up with their own list of coincidences between other pairs of presidents. There were two contest winners, Arturo Magidin of Mexico City, and Chris Fishel, a student at the University of Virginia. Magidin came up with sixteen stunning coincidences between Kennedy and former Mexican President Alvaro Obregón, while Fishel managed to come up with lists of coincidences between no fewer than twenty-one different pairs of U.S. presidents.

A few examples from Magidin's list: Both "Kennedy" and "Obregón" have seven letters each; each was assassinated; both their assassins had three names and died shortly after killing the president; Kennedy and Obregón were both married in years ending in 3, each had a son who died shortly after birth, and both came from large families and died in their forties.

Fishel came up with dozens of coincidences; here are a few between Thomas Jefferson and Andrew Jackson. Both men served two full terms; both their wives died before they became president; each had six-letter first names; both were in debt at the time of their deaths; each had a state capital named after him, and both their predecessors refused to attend their inaugurations. [For more information and the full lists, see *SI* Spring 1992, 16(3); and Winter 1993, 17(2).]

lation some one person will win the sweepstakes. With such incredibly unfavorable odds each person must decide for him or herself whether it is worth the time and the first class postage to return the entry. The sure big winner appears to be the postal service, which garners more than ten times the grand prize amount in postage.

So, the next time you hear, "It couldn't be just coincidence," you will be fully justified in answering, "Why not?"

Acknowledgement

I am indebted to Professor Russell N. Grimes of the University of Virginia for discussions of expressions leading to Figure 2 and Table 2.

Note

The price action was generated in a positive direction when the preceding digit is odd (except for 5) and in a negative direction when the preceding digit is even, with the magnitude of the direction given by the value of the digit. Thus preceding odd digits $1 + 3 + 7 + 9 = 20$ generate a positive direction and preceding even digits $0 + 2 + 4 + 6 + 8 = 20$ a negative direction. The sum in the two directions is the same. For the left over digit 5 the direction is up or down depending upon whether the previous digit is odd or even, respectively. In the first 108 decimal digits there are eight 5s, half each generating positive and negative directions. Therefore we have a perfectly arbitrary and equal balance between the positive and negative directions.

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Numerology: Comes the Revolution

Strange things can happen by coincidence. Strange things must *happen by coincidence. Fifty-sevens in the American Revolution provide an example.*

UNDERWOOD DUDLEY

Number mysticism—using nonrational insights into the nature of numbers to understand the universe better—goes back at least to the ancient Greeks. Five is the number of marriage, they said, and two is cold and wet. If knowing this enlarges your soul, so much the better for you. Numerology is *applied* number mysticism, and is much more recent. If a numerologist determines that your number is two, then you are cold and wet. Numerologists believe that numbers *cause* events. Pyramidologists see all human history in the numbers that they get from measuring the pyramid of Cheops. Users of *gematria,* the art and science of turning words into numbers and interpreting them, as SECOND = 19 + 5 + 3 + 15 + 14 + 4 = 60 (thus explaining why we tell time as we do), warn us away from those bearing the number of the beast, 666.

Elliott Wave theorists explain the behavior of the stock market with Fibonacci numbers.

Numerologists would like us to think that they are semi-scientists, investigating nature. An argument put forth again and again by pyramidologists, Stonehengers, Bible-searchers, and others who examine their chosen objects and find numbers in them, is that what they have found cannot have occurred by chance alone. There are just too many sevens and multiples of seven, or squares, or approximations to π, or whatever it is that they have found. A higher intelligence is involved, or a deity, or a secret group—someone had to put them there.

They fail to give chance sufficient credit. Amazing things can happen at random, but people are very reluctant to accept that. They insist that events must have causes, even when they don't. When children trip on rocks and hurt themselves, do they not sometimes give the rock a whop, saying "Bad rock!"? Wills, children think, are everywhere, even in inanimate objects, and wills exert themselves. Nothing happens by chance.

That is not the case. Consider the experiment (as far as I know never actually carried out) of giving each of 1,200 or so people a coin, telling them to flip it, keeping those people who flip a head and sending the rest home, and then repeating the process. After one flip, there will be roughly 600 remaining, after two around 300, and so on: the number of head-flippers will be cut approximately in half each time. After ten repetitions, there should be one flipper remaining who had tossed ten heads in a row, a remarkable exhibition of head-tossing ability. Would not he himself think that he had a rare talent? Would he not give interviews to the media, explaining his training methods and providing quotes like, "Yes, Dan, before the last toss I was tense, very tense, but I could feel the head-energy flowing through me and while the coin was in the air I was completely calm"?

Of course, head-energy had nothing to do with it. The operation of chance—blind, purposeless chance, bestowing punishments and rewards at random, with never a thought or a care for humanity—guaranteed that the lucky person would exist.

By the way, real interviews like that imaginary one occur constantly. Mutual-fund managers, explaining how their funds have beaten the market for ten years in a row, never say, "Well, I guess I was just lucky." They have methods. They have skills. They have reasons. Next year, when they do not beat the market, they will also have equally good reasons to explain why they did not repeat their success. Baseball players and other athletes frequently give similar interviews, as do people who live to the age of 100. Luck is never claimed as a factor, even when it in fact is a major factor.

Sometimes the number-hunters will give elaborate computations to demonstrate the improbability that what they have found could have occurred by chance. "What they have found" is the key phrase: It is no fair applying probability to events that have already happened. I have a dollar bill whose serial number (with letters) is F 84323030 C. The chance that I should have that bill is

$$\frac{1}{12}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{10}\cdot\frac{1}{25}$$

(1/12 because the first serial letter tells which of the twelve Federal Reserve Districts a bill comes from, and 1/25 instead of 1/26 for the final letter because I think that O is not used as a serial letter.) That is one in thirty billion, which is very small, too small, a number-hunter would say, to have happened by chance. It follows that some outside force must have seen to it that I should have that particular dollar bill.

Such logic, alas, does not follow. There is no "therefore" there. The probability that I possess *that* dollar bill is not .00000000003333. . ., it is 1, because I in fact have it. No outside forces are involved, besides the force of chance. Similarly, the chance that someone exists with exactly the genetic code that you have in your chromosomes is so close to zero that it makes no difference—much smaller than one in a mere thirty billion—but I do not conclude that you are so improbable that mysterious outside forces must be responsible for your existence. Your existence is no more mysterious than mine, or than that of any of our billions of fellow humans. We are here, and for no other reason than chance.

Given something that exists and has any complexity to it, the ingenious minds of humans can find all sorts of amazing things in it, whether they were put there on purpose or not. An example is given by a miniature pamphlet, *History Computed*, by Arthur Finnessey. Mr. Finnessey, browsing through an encyclopedia, was struck by the fact that

> four of the first six U. S. Presidents were inaugurated at age 57. On a presidential data chart in an encyclopedia the four 57s stand out at the top of their column and surprisingly there is not another age 57 in the remainder of the long list.

This started him looking for other 57s.

> Stranger still upon investigation is the discovery that the four are spillovers from extensive coincidences of 57 earlier in American History . . . Against the laws of probability, history and arithmetic came together making possible precise computations which until now were hidden in the record. (Finnessey, pp. 1–2.)

He found a *lot* of 57s. To show how many, it is necessary to quote at length. The "tea chest number" referred to below is 342 (6×57), the number of chests of tea that Finnessey says were thrown into the harbor at the Boston Tea Party. When Finnessey refers to an "alphabetical sequence number" he is

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using gematria to convert a word to a number using the standard a = 1, b = 2, . . . , z = 26 alphabet.

A few weeks after Lafayette's 57th birthday in September, 1814, Francis Scott Key wrote the Star Spangled Banner. When Lafayette died the Declaration of Independence was 57 years old. The alphabetical sequence numbers in the names George Washington-Thomas Jefferson-Lafayette total 456 (8×57), the sum of the double United States of America in the Declaration of Independence. The combined 16 times 57 matches the 912 days from Lexington to Saratoga. Most sources place the number of prisoners taken at Saratoga at some 57-hundred.

Dec. 25, 1777, Christmas at Valley Forge: Washington's army was ragged, starving and freezing. On Christmas day, 1783, Washington was to arrive at Mount Vernon, home after victory in war. The time between the two extremes of fortune was to be exactly 57 months plus 57 weeks plus 57 days. The alphabetical sequence total of Mount Vernon is 171 (3×57).

On Feb. 6, 1776, exactly 57 weeks after the Jan. 3, 1777 Battle of Princeton, France openly joined the struggle for Independence. Princeton and Yorktown, Washington's two victories over Cornwallis, were 57 months apart. The alphabetical sequence total of Princeton is 114 (2×57).

The 57th month of the Revolution ended on Jan. 19, 1780, and 114 (2×57) days later, on May 12, Charleston fell to the British. Its fall was 684 (12×57) days after the Battle of Monmouth, June 28, 1776.

The fateful year of Yorktown began with two battles 57 days apart, at Cowpens, N. C., Jan. 17, 1781, and at Guilford Court House, N. C., March 15.

April 19, 1781, the last wartime anniversary of Lexington and Concord was exactly 57 months plus 57 weeks and 57 days after those first battles.

In June, 1781, 57 Americans died in the assault on the British Fort Ninety Six in South Carolina. Ninety Six is the total for the signers of the Declaration of Independence, 57, and the Constitution, 39.

When French naval forces turned back the 19 British warships sent to aid Cornwallis he became trapped at Yorktown and he surrendered on Oct. 19, virtually ending the military phase of the war that began April 19, 1775. The three 19's total 57.

The name Yorktown fitted in exactly with what went before. The alphabetical sequence numbers of Continental Congress-Lexington-Saratoga-Yorktown total 570 (10×57). Multiplied by a hundred the result is 57,000, the hours from Lexington to Yorktown consisting of 3,420,000 minutes, ten thousand times the six times 57 tea chest number.

After his surrender Cornwallis spent another 57 days on American soil, sailing for England with Benedict Arnold on Dec. 15, the day George III wrote a directive dated 57 days after Yorktown exhorting Parliament to continue the war.

The first Christmas after Yorktown was 342 (6×57) days after the American victory at Cowpens which began the year. The first Fourth of July after Yorktown was exactly 57 months plus 57 weeks and 57 days after July 4, 1776.

Exactly 684 (12×57) days after Yorktown the Treaty of Paris was signed on Sept. 3, 1783. England thereby renounced her claim to sovereignty over the Colonies 285 (5×57) years after John and Sebastian Cabot, in 1498, had sailed along what was to become the Colonial coast. The combined alphabetical sequence numbers of England-United States of America total 285, matching the five times 57 years.

After the treaty the coincidence number 57 and the independence number 76 combined to measure the 133 days to its ratification on Jan. 14, 1784, 3,192 (56×57) days after Lexington and Concord. There are 3,192 hours in 133 days.

Nine states were needed to ratify the Constitution. The 57 yes votes of New Hampshire overrode the nays to make it the ninth. All Constitutional law begins with the 57th word of the Constitution, that 57th word, All, being the first word of the first section of the first article. After the original seven articles the closing paragraph together with Washington's signature and titles comprise 57 words.

In 1789 the young nation established the United States Government then proceeded on a 57-year march of expansion across the continent to the 1846 conquest of California.

On Feb. 22, 1846, the Liberty Bell rang in its tower for the last time in tribute to George Washington, 57 years after his 57th birthday when he was president-elect.

This version of history began with the four 57's listed in a column on a chart. They total 228 and the four presidents' order of service numbers in the first column 1, 3, 4 and 6, total 14. Fourteen times 228 equals 3,192 (56×57), the days of the Revolution. [Finnessey, pp. 18–24]

There are several possible reactions to that recital of 57s. One is boredom, since not everyone will find Finnessey's work interesting. Another is amazement, which can take two forms. The first is amazement at the number of 57s surrounding the American Revolution. There are too many for them to be there

NUMEROLOGY
continued on page 59

Calculated Risks

We are notoriously bad at assessing risk. Cultural context and human psychology come into play at least as much as statistical realities. For instance, our perceptual apparatus is geared towards exotic, personal, dramatic threats. This doesn't mean we're ignorant; just human.

K. C. COLE

Newsweek magazine plunged American women into a state of near panic some years ago when it announced that the chances of a college-educated thirty-five-year-old woman finding a husband was less than her chance of being killed by a terrorist. Although Susan Faludi made mincemeat of this so-called statistic in her book *Backlash*, the notion that we can precisely quantify risk has a strong hold on the Western psyche. Scientists, statisticians, and policy makers attach numbers to the risk of getting breast cancer or AIDS, to flying and food additives, to getting hit by lightning or falling in the bathtub.

Yet despite (or perhaps because of) all the numbers floating around, most people are quite properly confused about risk. I know people who live happily on the San Andreas Fault and yet are afraid to ride the New York subways (and

vice versa). I've known smokers who can't stand to be in the same room with a fatty steak, and women afraid of the side effects of birth control pills who have unprotected sex with strangers. Risk assessment is rarely based on purely rational considerations—even if people could agree on what those considerations were. We worry about negligible quantities of Alar in apples, yet shrug off the much higher probability of dying from smoking. We worry about flying, but not driving. We worry about getting brain cancer from cellular phones, although the link is quite tenuous. In fact, it's easy to make a statistical argument—albeit a fallacious one—that cellular phones prevent cancer, because the proportion of people with brain tumors is smaller among cell phone users than among the general population.[1]

Even simple pleasures such as eating and breathing have become suspect. Love has always been risky, and AIDS has made intimacy more perilous than ever. On the other hand, not having relationships may be riskier still. According to at least one study, the average male faces three times the threat of early death associated with not being married as he does from cancer.

Of course, risk isn't all bad. Without knowingly taking risks, no one would ever walk out the door, much less go to school, drive a car, have a baby, submit a proposal for a research grant, fall in love, or swim in the ocean. It's hard to have any fun, accomplish anything productive, or experience life without taking on risks—sometimes substantial ones. Life, after all, is a fatal disease, and the mortality rate for humans, at the end of the day, is 100 percent.

Yet, people are notoriously bad at risk assessment. I couldn't get over this feeling watching the aftermath of the crash of TWA Flight 800 and the horror it spread about flying, with the long lines at airports, the increased security measures, the stories about grieving families day after day in the newspaper, the ongoing attempt to figure out why and who and what could be done to prevent such a tragedy from happening again.

Meanwhile, tens of thousands of children die every day around the world from common causes such as malnutrition and disease. That's roughly the same as a hundred exploding jumbo jets full of children every single day. People who care more about the victims of Flight 800 aren't callous or ignorant. It's just the way our minds work. Certain kinds of tragedies make an impact; others don't. Our perceptual apparatus is geared toward threats that are exotic, personal, erratic, and dramatic. This doesn't mean we're ignorant; just human.

This skewed perception of risk has serious social consequences, however. We aim our resources at phantoms, while real hazards are ignored. Parents, for example, tend to rate drug abuse and abduction by strangers as the greatest threats to their children. Yet hundreds of times more children die each year from choking, burns, falls, drowning, and other accidents that public safety efforts generally ignore.

We spend millions to fight international terrorism and wear combat fatigues for a morning walk to protect against Lyme disease. At the same time, "we see several very major problems that have received relatively little attention," write Bernard Cohen and I-Sing Lee in *Health Physics*. The physicists suggest—not entirely tongue in cheek—that resources might be far more efficiently spent on programs such as government-organized computer dating services. "Favorable publicity on the advantages of marriage might be encouraged."

K.C. Cole

It's as if we incarcerated every petty criminal with zeal, while inviting mass murderers into our bedrooms. If we wanted to put the money on the real killers, we'd go after suicide, not asbestos.

Even in terms of simple dollars, our policies don't make any sense. It's well known, for example, that prenatal care for pregnant women saves enormous amounts of money—in terms of care infants need in the first year of life—and costs a pittance. Yet millions of low-income women don't get it.

Numbers are clearly not enough to make sense of risk assessment. Context counts, too. Take cancer statistics. It's always frightening to hear that cancer is on the rise. However, at least one reason for the increase is simply that people are living longer—long enough to get the disease.

Certain conclusions we draw from statistics are downright silly. Physicist Hal Lewis writes in *Technological Risk* that per mile traveled a person is more likely to be killed by a car as a pedestrian than as a driver or passenger. Should we conclude that driving is safer than walking and therefore that all pedestrians should be forced into cars?

Charles Dickens made a point about the absurdity of misunderstanding numbers associated with risk by refusing to ride the train. One day late in December, the story goes, Dickens announced that he couldn't travel by train any more that year, "on the grounds that the average annual quota of railroad accidents in Britain had not been filled and therefore further disasters were obviously imminent."

Purely numerical comparisons also may be socially unacceptable. When the state of Oregon decided to rank its medical

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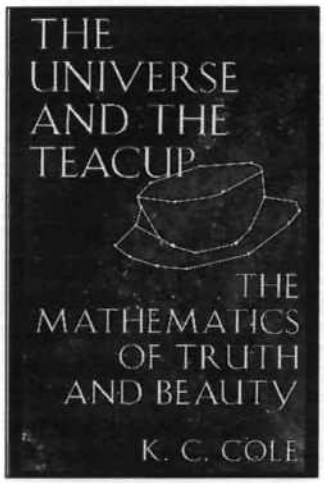

services according to benefit–cost ratios, some results had to be thrown out—despite their statistical validity. Treatment for thumb sucking, crooked teeth, and headaches, for example, came out on the priorities list ahead of therapy for cystic fibrosis and AIDS.

What you consider risky, after all, depends somewhat on the circumstances of your life and lifestyle. People who don't have enough to eat don't worry about apples contaminated with Alar. People who face daily violence at their front door don't worry about hijackings on flights to the Bahamas. Attitudes toward risk evolve in cultural contexts and are influenced by everything from psychology to ethics to beliefs about personal responsibility.

Sense of Control

In addition to context, another factor needed to see through the maze of conflicting messages about risk is human psychology. For example, imminent risks strike much more fear into our hearts than distant ones; it's much harder to get a teenager than an older person to take long-term dangers like smoking seriously.

Smoking is also a habit people believe they can control, which makes the risk far more acceptable. (People seem to get more upset about the effects of passive smoking than smoking itself—at least in part because smokers get to choose, and breathers don't.)

As a general principle, people tend to grossly exaggerate the risk of any danger perceived to be beyond their control, while shrugging off risks they think they can manage. Thus, we go skiing and skydiving, but fear asbestos. We resent and fear the idea that anonymous chemical companies are putting additives into our food; yet the additives we load onto our own food—salt, sugar, butter—are millions of times more dangerous.

This is one reason that airline accidents seem so unacceptable—because strapped into our seats in the cabin, what happens is completely beyond our control. In a poll taken soon after the TWA Flight 800 crash, an overwhelming majority of people said they'd be willing to pay up to fifty dollars more for a round-trip ticket if it increased airline safety. Yet the same people resist moves to improve automobile safety, for example, especially if it costs money.

The idea that we can control what happens also influences who we blame when things go wrong. Most people don't like to pay the costs for treating people injured by cigarettes or riding motorcycles because we think they brought these things on themselves. Some people also hold these attitudes toward victims of AIDS, or mental illness, because they think the illness results from lack of character or personal morals.

Risks and Benefits

In another curious perceptual twist, risks associated with losing something and gaining something appear to be calculated in our minds according to quite different scales. In a now-classic series of studies, Stanford psychologist Amos Tversky and colleague Daniel Kahneman concluded that most people will bend over backward to avoid small risks, even if that means sacrificing great potential rewards. "The threat of a loss has a greater impact on a decision than the possibility of an equivalent gain," they concluded. In one of their tests, Tversky and Kahneman asked physicians to choose between two strategies for combating a rare disease, expected to kill 600 people. Strategy A promised to save 200 people (the rest would die), while Strategy B offered a one-third probability that everyone would be saved, and a two-thirds probability that no one would be saved. Betting on a sure thing, the physicians choose A. But presented with the identical choice, stated differently, they choose B. The difference in language was simply this: instead of stating that Strategy A would guarantee 200 out of 600 saved lives, it stated that Strategy A would mean 400 sure deaths.

People will risk a lot to prevent a loss, in other words, but risk very little for possible gain. Running into a burning house to save a pet or fighting back when a mugger asks for your wallet are both high-risk gambles that people take repeatedly in order to hang on to something they care about. The same people might not risk the hassle of, say, fastening a seat belt in a car even though the potential gain might be much higher.

The bird in the hand always seems more attractive than the two in the bush. Even if holding on to the one in your hand comes at a higher risk and the two in the bush are gold-plated.

The reverse situation comes into play when we judge risks of commission versus risks of omission. A risk that you assume by actually doing something seems far more risky than a risk you take by not doing something, even though the risk of doing nothing may be greater.

Death from natural causes, like cancer, are more readily acceptable than deaths from accidents or murder. That's probably one reason it's so much easier to accept thousands of starving children than the death of one in a drive-by shooting. The former is an act of omission—a failure to step in and help, send food or medicine. The latter is the commission of a crime—somebody pulled the trigger.

In the same way, the Food and Drug Administration is far more likely to withhold a drug that might help a great number of people if it threatens to harm a few; better to hurt a lot of people by failing to do something than act with the deliberate knowledge that some people will be hurt. Or as the doctors' credo puts it: First do no harm.

Vivid Risks

For obvious reasons, dramatic or exotic risks seem far more dangerous than more familiar ones. Plane crashes and AIDS are risks associated with ambulances and flashing lights, sex and drugs. While red dye number two strikes terror in our hearts, that great glob of butter melting into our baked potato is accepted as an old friend. "A woman drives down the street with her child romping around in the front seat," says John Allen Paulos. "Then they arrive at the shopping mall, and she grabs the child's hand so hard it hurts, because she's afraid he'll be kidnapped."

Children who are kidnapped are far more likely to be whisked away by relatives than strangers, just as most people are murdered by people they know.

Familiar risks creep up on us like age and are often difficult to see until it's too late to take action. Mathematician Sam C. Saunders of Washington State University reminds us that a frog placed in hot water will struggle to escape, but the same frog placed in cool water that's slowly warmed up will sit peacefully until it's cooked. "One cannot anticipate what one does not perceive," he says, which is why gradual accumulations of risk due to lifestyle choices (like smoking or eating) are so often ignored. We're in hot water, but it's gotten hot so slowly that no one notices.

To bring home his point, Saunders asks us to imagine that cigarettes are not harmful—with the exception of an occasional one that has been packed with explosives instead of tobacco. These dynamite-stuffed cigarettes look just like normal ones. There's only one hidden away in every 18,250 packs—not a grave risk, you might say. The only catch is, if you smoke one of those explosive cigarettes, it might blow your head off.

The mathematician speculates, I think correctly, that given such a situation, cigarettes would surely be banned outright. After all, if 30 million packs of cigarettes are sold each day, an average of 1,600 people a day would die in gruesome explosions. Yet the number of deaths is the same to be expected from normal smoking. "The total expected loss of life or health to smokers using dynamite-loaded (but otherwise harmless) cigarettes over forty years would not be as great as with ordinary filtered cigarettes," says Saunders.

We can accept getting cooked like a frog, in other words, but not getting blown up like a firecracker.

The Ego Element

It won't come as a great surprise to anyone that ego also plays a role in the way we assess risks. Psychological self-protection leads us to draw consistently wrong conclusions. In general, we overestimate the risks of bad things happening to others, while vastly underrating the possibility that they will happen to ourselves. Indeed, the lengths people go to minimize their own perceived risks can be downright "ingenious," according to Rutgers psychologist Neil Weinstein. For example, people asked about the risk of finding radon in their houses always rate their risk as "low" or "average," never "high." "If you ask them why," says Weinstein, "they take anything and twist it around in a way that reassures them. Some say their risk is low because the house is new; others, because the house is old. Some will say their risk is low because their house is at the top of a hill; others, because it's at the bottom of a hill."

Whatever the evidence to the contrary, we think: "It won't happen to me." Weinstein and others speculate that this has something to do with preservation of self-esteem. We don't like to see ourselves as vulnerable. We like to think we've got some magical edge over the others. Ego gets involved especially in cases where being vulnerable to risk implies personal failure—for example, the risk of depression, suicide, alcoholism, drug addiction. "If you admit you're at risk" says Weinstein, "you're admitting that you can't handle stress. You're not as strong as the next person."

It's as if we incarcerated every petty criminal with zeal, while inviting mass murders into our bedrooms. If we wanted to put the money on the real killers, we'd go after suicide, not asbestos.

Average people, studies have shown, believe that they will enjoy longer lives, healthier lives, and longer marriages than the "average" person. Despite the obvious fact that they themselves are, well, average people, too. According to a recent poll, 3 out of 4 baby boomers (those born between 1946 and 1964) think they look younger than their peers, and 4 out of 5 say they have fewer wrinkles than other people their age—a statistical impossibility.

Kahneman and Tversky studied this phenomenon as well and found that people think they'll beat the odds because they're special. This is no doubt a necessary psychological defense mechanism, or no one would ever get married again without thinking seriously about the potential for divorce. A clear view of personal vulnerability, however, could go a long way toward preventing activities like drunken driving. But then again, most people think they are better than average drivers—even when intoxicated.

We also seem to believe it won't happen to us if it hasn't happened yet. That is, we extrapolate from the past to the future. "I've been taking that highway at eighty miles per hour *for ten years and I haven't crashed yet," we tell ourselves. This* is rather like reasoning that flipping a coin ten times that comes up heads guarantees that heads will continue to come up indefinitely.

Tragedy versus Statistics

Curiously, one advertising campaign against drunken driving that was quite successful featured the faces of children killed by drunken drivers. These children looked real to us. We could identify with them. In the same way as we could identify with the people on TWA Flight 800. It is much easier to empathize with someone who has a name and a face than a statistic.

That explains in part why we go to great expense to rescue children who fall down mine shafts, but not children dying from preventable diseases. Economists call this the "rule of rescue." If you know that someone is in danger and you know that you can help, you have a moral obligation to do so. If you don't know about it, however, you have no obligation. Columnist Roger Simon speculates that's one reason the National Rifle Association lobbied successfully to eliminate the program at the Centers for Disease Control that keeps track of gun deaths.

If we don't have to face what's happening, we won't feel obligated to do anything about it.

Even without the complication of all these psychological factors, however, calculating risks can be tricky because not everything is known about every situation. "We have to concede that a single neglected or unrecognized risk can invalidate all the reliability calculations, which are based on known risk," writes Ivar Ekeland. There is always a risk, in other words, that the risk assessment itself is wrong.

Genetic screening, like tests for HIV infection, has a certain probability of being wrong. If your results come back positive, how much should you worry? If they come back negative, how safe should you feel?

The more factors involved, the more complicated the risk assessment becomes. When you get to truly complex systems like nationwide telephone networks and power grids, worldwide computer networks, and hugely complex machines like space shuttles, the risk of disaster becomes infinitely harder to pin down. No one knows when a minor glitch will set off a chain reaction of events that will culminate in disaster. Potential risk in complex systems, in other words, are subject to exponential amplification.

Needless to say, the way a society assesses risk is very different from the way an individual views the same choices. Whether or not you wish to ride a motorcycle is your own business. Whether society pays the bills for the thousands of people maimed by cycle accidents, however, is everybody's business. Any one of us might view our own survival on a transatlantic flight as more important than the needs of the nation's children. Governments, one presumes, ought to have a somewhat different agenda.

But how far does society want to go in strictly numerical accounting? It certainly hasn't helped much in the all-important issue of health care, where an ounce of prevention has been proven again and again to be worth many pounds of cures. Most experts agree that we should be spending much more money preventing common diseases and accidents, especially in children. But no one wants to take health dollars away from precarious newborns or the elderly—where most of it goes. These are decisions that ultimately will not be made by numbers alone. Calculating risk only helps us to see more clearly what exactly is going on.

According to anthropologist Melvin Konner, author of *Why the Reckless Survive*, our poor judgment about potential risks may well be the legacy of evolution. Early peoples lived at constant risk from predators, disease, accidents. They died young. And in evolutionary terms, "winning" means not longevity, but merely sticking around long enough to pass on your genes to the next generation. Taking risk was therefore a "winning" strategy, especially if it meant a chance to mate before dying. Besides, decisions had to be made quickly. If going for a meal of ripe berries meant risking an attack from a saber-toothed tiger, you dove for the berries. For a half-starved cave dweller, this was a relatively simple choice. Perhaps our brains are simply not wired, speculates Konner, for the careful calculations presented by the risks of modern life.

Indeed, some of our optimistic biases toward personal risk may still serve important psychological purposes. In times of stress and danger, they help us to put one foot in front of the other; they help us to get on with our lives, and out the door.

In the end, Konner, the cautious professor, ruminates somewhat wistfully about his risk-taking friends—who smoke, and ride motorcycles, and drive with their seat belts fastened behind them. Beside them he feels "safe and virtuous" yet somehow uneasy. "I sometimes think," he muses, "that the more reckless among us may have something to teach the careful about the sort of immortality that comes from living fully every day."

Note

1. John Allen Paulos was the first person I know of to make this calculation; it is probably related to the fact that people who use cellular phones are on average richer, and therefore healthier, than people who don't.

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How to Study Weird Things

Many students are asking to study unconventional topics. There are strategies for working with these students that increase their critical aptitude and analytical reasoning without disenchanting them with science and traditional disciplines.

FRANK TROCCO

As a science teacher in an interdisciplinary undergraduate program, I often encounter students who want to study topics that many of my colleagues would find nonacademic, and certainly unscientific, such as astrology, Reiki, channeling, Tarot, homeopathy, and ESP. What can an instructor, working within the western scientific tradition, do with such requests? One approach is to clearly explain to the student that these topics "aren't science," and they are not going to learn anything from researching them. I think that this gets a student nowhere, and it is just such an attitude that makes many afraid to pursue unconventional interests. This position also reinforces the students' mistrust of science, professors, and academia, an attitude that they will find no shortage of in the books written on the unconventional subjects of their choice.

A few years ago I stopped fighting the New Age educational tide. I asked myself if there were ways that I could turn a student's curiosity to pedagogical advantage. These students were coming to me with enormous enthusiasm for study and research. How could I maneuver this interest into credible, academic work, which would also appear credible and academic to my colleagues? I realized that if I framed their scholastic approach creatively it would be an opportunity for these students to begin learning about science, the scientific method, and critical thinking.

Since then I have tried to help students take subjects that they are already interested in, regardless of how eccentric they may seem from the standpoint of traditional academia, and complicate them. I help them to fashion their interest into a traditional study by choosing an analytical approach we are both satisfied with. Sometimes this is easy, but sometimes it takes quite a bit of creativity. My first step is to ask the students if they want their studies to be credible. For many, this is a pivotal question, as they may be intending to eventually practice the discipline they want to study. For others, this work may be tied to deeply held beliefs. Typically, the question of credibility begins to encourage an openness towards broadening their work.

Is Studying Weird Subjects Credible?

Even though students may intensely want to research an unconventional topic, they are often unaware that it may not be possible to grant credit for studying these areas by reading the books and articles written by the field's practitioners and proponents. As defined and interpreted by the "believers," these are subjects that accrediting institutions and most faculty will not see as academically admissible.

One student asked me about this in regard to her topic, Polarity Therapy. I told her that although she can go to an institution like the American Polarity Therapy Association (APTA), and take legitimate and respected courses, they are only "legitimate and respected" within a narrow spectrum of schools. Accredited colleges and universities attempt to say something different from the APTA. They claim that what an individual is learning in their classrooms, although open to critique and correction, is reliable and broadly applicable. It is the best that the western analytical model has come up with through comprehensive research. If someone wants to investigate something unconventional, the challenge is to transform the study into work that is rigorous and scholarly. How can we accomplish this?

An initial approach is to look at the unorthodox subject through the lens of an established discipline, using the epistemological and methodological foundations and standards of that system. With this procedure, any subject can be examined and becomes credible by traditional academic standards. For instance, if we look at Polarity Therapy (PT) through the lens of history, sociology, or psychology, we can use these disciplines to lend their credibility to our studies, asking legitimate research questions such as: How and where did PT originate? Are there demographic differences in the patients who use PT? Do alternative medical modalities satisfy patients in ways that allopathic medicine does not? Students are often intrigued by scholastic questions closely tied to their unconventional pursuits.

This approach is useful in interdisciplinary programs, where students need credits in a variety of areas. In my work I primarily use the discipline of science studies to meet conventional criteria. In this case, the questions might be: Are the techniques of PT scientific? How does PT compare with scientifically established medical techniques? Even students who claim that they "do not agree with science" are eager to look at these questions in an attempt to justify their beliefs.

The basic idea is to provide the student with a method to examine their subject as an objective outsider, free of unavoidable misconceptions inherent in exploring a subject from too close a perspective.

Using a Book List in Reverse

After we have established an investigative discipline and an appropriate research question, I encourage students to read the skeptical literature on their subject. These are the books that can offer them a challenging perspective from which to examine unconventional topics, deepening their studies. It is helpful to have them read something that looks at a broad range of critical thinking as it applies to unconventional ideas (e.g., Gilovich 1991; Randi 1982; Schick and Vaughn 1995; Shermer 1997), although it is sometimes difficult for non-science-oriented students to completely work their way through one of these texts. Since my students are all working on independent studies, and not in a classroom, they do not have an instructor immediately available to help them through difficult intellectual terrain. In this case, specific articles on their topic taken out of anthologies (e.g., Frazier 1991) or journal reprints from skeptical journals are most helpful.

This material can often be a frontal assault on their beliefs, which is helpful only for some students. After all, most of them are interested in proving that their unconventional topic has research merit and ultimate validity. In this case, I alter the research approach, using an ancient rhetorical strategy for building an argument. I explain to them that, curiously, skeptical articles and books actually include potentially corroborative insights about unorthodox science and medicine. These skeptical resources are a good place to probe unconventional topics, by letting the debunkers do the background research.

Let us say that you are interested in channeling, and you read a number of the articles that Martin Gardner has written on this subject (e.g., Gardner 1996). Of course, the thrust of his rhetoric will be to challenge mediums and channelers; however, in order to do this effectively he will first tell you all

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about them, including the history of channeling, biographies of famous channelers and unexplained channeling sessions, why channelers themselves think channeling works, stories about exposed channeling frauds, former channelers who have exposed fraudulent channeling, magicians who have replicated the techniques of mediums and psychics, and (importantly) any celebrated (albeit controversial) results coming from conventional laboratories. All this will be followed by citations for books and articles where you can follow up on his sources.

If students are seriously interested in channeling, Gardner may have just saved them a frustrating day of basic library research. They can repeat this process for almost any unconventional topic. Even though these skeptical authors are frequently debunking this research, some of what they are challenging are findings by scientists in reputable university laboratories. Research results can be interpreted in a multitude of ways, and dubious methodology eventually verified or disputed. There is no reason why a student cannot find these articles and cite them in reverse of the skeptics.

Some educators may protest that these students are reading this material for the wrong reasons and missing the point. In my experience, however, students gradually change how they view their topics. An individual may not alter her fundamental beliefs in the efficacy of channeling, but she will learn that its truth value and applicability are not obvious, and that the phenomena may simply be due to natural, unrecognized determinants (e.g., an active imagination). This leads the student to further inquiry. Importantly, students using skeptical reports and analysis in reverse, and in support of their hypotheses, have *engaged* themselves in the research process.

Once students begin their research it is important to move them beyond the opinions of the believers into scholarly references. Simply because information is in a book does not mean that you can quote the opinion or research and it will substantiate your position. For instance, students can quote the Bible to support a point they are making about the existence of God, and although this may have purchase with a minority of their readers, its value as evidence would be lost on most. Books that scholars do not find credible can be used as long as proper disclaimers and a critical review are added. This distinction between valid and invalid references can be discouraging to students who may feel they are on the right research track, only to discover their resources are of dubious distinction.

Sandy's Talking Goldfish

Sandy is a woman who is intensely interested in nature and animals. She works at a nature center where it is her job to take people on walks and introduce them to the local plants, animals, and ecology. She is also someone who believes fervently that people can communicate with animals and that animals have something interesting to tell us about ourselves. Her writing often includes anecdotes describing conversations with her goldfish.

When I asked Sandy if she wanted to appear credible, I could see her eyes light up. "Of course," she said. Since she already had experiences with the public, she knew how difficult it was to explain the ideas she sincerely believed in. It was not difficult encouraging her to read skeptical authors, so she would know "the other side of the story." I suggested that she read Schick and Vaughn's *How to Think About Weird Things: Critical Thinking for a New Age.*

At an informal discussion in the middle of the semester some students, all of whom were involved in unconventional studies, were sitting around discussing the books they had been reading. Suddenly, Sandy launched into an hysterical tirade against "Schick and Vaughn." She proudly told the others that she had finished the book and continued, "I was *so* frustrated. I wanted to tell them a thing or two. I'd be reading it in my living room and I'd say out loud, 'Schick and Vaughn, do you believe in *anything?*' There were so many times I took my pen and underlined things and wrote in the margin: Yeah, Schick and Vaughn, I'd like to see *you* prove something!"

Skeptical inquiry should not be something that redirects a student from his or her passion; instead it should enrich their work.

We all laughed at this harangue, but I was smiling contentedly inside. Sandy was irritated by the book, and probably had not gotten the full message that the authors intended her to receive, but she was intensely involved with the book and its ideas. It was an interactive workbook for her, and its lesson and cautions about examining fringe beliefs became subtle parts of her perspective, obvious in her essays and analyses.

"Why Do I Have to Address the Skeptics Anyway?"

This statement is the way one irritated student, who was working on Traditional Chinese Medicine, complained about looking into the skeptical viewpoint. I had two immediate responses. First, it indicates thorough research and scholarship about a subject to know its weaknesses, as well as the claims of the proponents. And second, it will help you to establish your credibility.

"To whom?" he asked, since he did not want to fight over concepts and energies that he believed were not measurable. I suggested to him that there were many possible situations in his future where knowing the science, criticism, and full spectrum of issues behind his unconventional subject would be of assistance. For example: 1) With clients who are trying to make a decision between an unconventional therapy and orthodox medicine; 2) At professional meetings where research is critiqued; 3) When writing papers, either popular or scholarly; 4) For protection, as some day someone in power may decide that the unconventional modality he is practicing is dangerous and declare that it is against the law. (I often use the examples of herbs and midwifery, both threatened by government control.); or, 5) To prepare himself for newspaper or radio interviews.

These are all forums where it helps students to have done their homework faithfully. They may not presently see them-

selves in these situations, but if they stay in an unconventional field the chances are high that they will find themselves there eventually.

Hard Evidence

I once had a student say that she was not interested in arguing with the skeptics, but that she wanted to find "hard evidence" for her beliefs, in this case astrology. I agreed with her that many people do not like to assume an adversarial posture. I pointed out that she did not need to be familiar with all the issues, claims, and counter-claims surrounding astrology so that she could debate with the skeptics. Critically reviewing unorthodox claims is not necessarily about argument, but about fully understanding what you are investigating so you can articulate it clearly and competently.

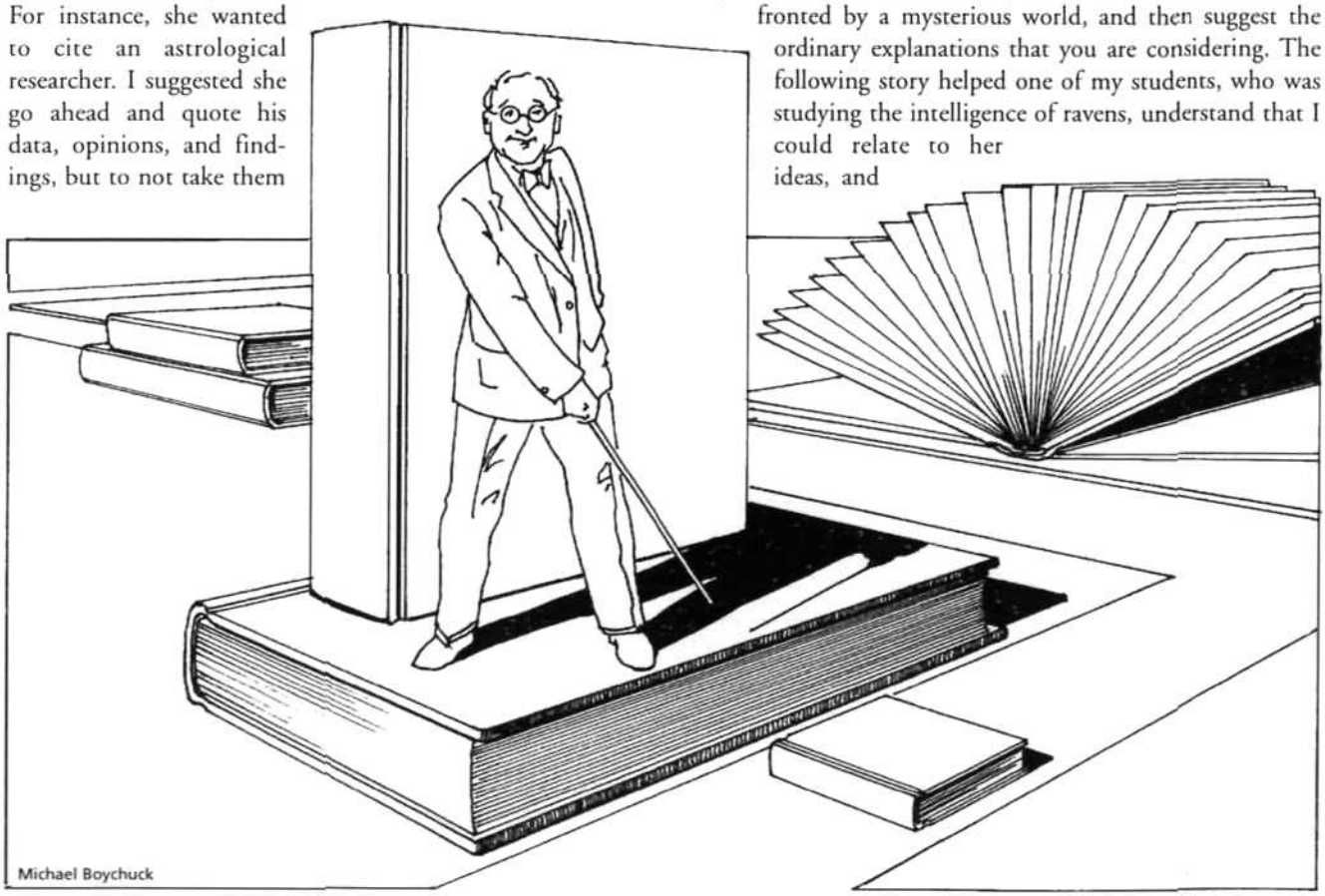
Students worry that including the skeptical viewpoint in an essay will weaken their position with the reader. In fact, it will have just the opposite effect. Including disparate views will indicate that their research has been thorough, and that they are not afraid of controversial or disconfirming data. In most essays, it is not necessary to completely refute skeptical hypotheses. Simply acknowledging them will often add strength to the student's argument.

I told the student who was interested in astrology that if she was really committed to looking for the "hard evidence" then she could not avoid examining skeptical perspectives. It is the skeptics who attempt to make unconventional evidence "soft." For instance, she wanted to cite an astrological researcher. I suggested she go ahead and quote his data, opinions, and findings, but to not take them completely at face value. Ask some probing questions: Is his work reputable? How do you know it is? What are reasons skeptics offer to question his results? If a student is looking for substantive evidence he or she cannot avoid these questions. It is the difference between deciding that something feels right, and knowing that it is right.

Looking into the skeptical side of things does not have to take away from the student's interests or primary work. Skeptical inquiry should not be something that redirects a student from his or her passion; instead it should enrich their work. Although sometimes scholarship demands us to look into things that seem to take us far afield, it is ultimately useful if this work and time help us to strengthen our analysis. When I suggest that a student look at the skeptical side of things I mean: 1) Reading an article about their subject written by a critical author; 2) Interviewing a researcher who does not agree with the student's approach; 3) Looking at some of the general objections to unorthodox modalities; or, 4) Reading a book that would help them think critically about unconventional topics. This is not a large commitment, it is simply a beginning.

Mr. Whitewing: Openness to the Unconventional

I try to empathize with students attempting unconventional studies, and to treat their work like any conventional research project. By doing this I let them know that I realize the complexities of the world that we share. Occasionally, it is helpful to point out situations where you, as an instructor, are confronted by a mysterious world, and then suggest the ordinary explanations that you are considering. The following story helped one of my students, who was studying the intelligence of ravens, understand that I could relate to her ideas, and



Michael Boychuck

also form alternative explanations for seemingly inexplicable phenomena. I told her:

"I was sitting in the physics library reading. Actually, I was staring out the window watching two ravens hop around the parking lot. One of them turned sideways and I noticed that it had a conspicuous white patch of feathers at the top of its wing. When it turned, I noticed that it had a corresponding patch on the other wing. When this unusual bird flew off, its epaulets left a striking pattern of flashing white freckles.

Days later, I was in a different building, sitting in my office, reading your paper about intelligence in ravens. You claimed that, even without scientific evidence, you realized certain things about ravens by intuition. As I read, I marked the places where I thought you should have provided corroborative evidence. I muttered, 'No, this won't do,' or 'This isn't convincing,' writing my comments in the margins. Suddenly, I looked up and out my window, which overlooks some roof tops. There was Mr. Whitewing, unmistakably perched on the roof right outside, staring in the window at me! He hopped around for quite some time, as if not to let me forget about his presence too quickly."

My student was impressed by this extraordinary anecdote. However, as I told her later, I discovered that the ornithology department on campus was marking ravens in this way to keep track of them. It was not a natural coloration, and perhaps, not even the same Mr. Whitewing at my window. It is helpful to demonstrate that your intellect can be broad when thinking about the boundary between the real and the imaginary, but that the line between magic and science is not always impossible to distinguish.

There are some scholars, however, who believe that the demarcation between science and magic is completely ambiguous. In this view, science is a narrative, similar to any other cultural mythology. This critique of science is one approach for students with unconventional studies to use in their analyses. After all, if science itself is built on an insecure foundation, how can it make any epistemic demands on what it classifies as pseudoscience? Unfortunately, this provocative intellectual observation, besides being confusing for many students, can turn hopelessly relativistic, which is ultimately unhelpful for a student seeking credibility. It is necessary to guide students with care along the path of scientific deconstruction, so that all of western theory and expertise are not abandoned.

Pedagogical Kindness

For those of us who have happily worked with science and analytical thinking for years, it is difficult to realize how frustrating it may be for students to look at challenging ideas. Students can be resistant to opinions that have the potential to upset their worldview; even if they embrace the quest it can lead to upsetting realizations about themselves and their world. As educators, it is important to work with students in a process-oriented and developmental model. It does not help to be condescending or pejorative about their deeply held beliefs, even if these beliefs seem totally absurd. Anyone who has worked with students who hold unconventional views, or who believe in seemingly useless health modalities, knows how deeply these ideas are felt. It is important to realize that students who follow your suggestions, carefully reading critical books and thinking about the skeptical approach, can experience a minor existential crisis. Suddenly they will not know what to believe, and many things they have based their lives on may be insecure. It behooves you, at these moments, to be an ally.

Studying Things That Don't Exist

It is common for students to approach science educators with the intention to study phenomena that the instructor may not believe exists. Where does this leave you as their guide on this unconventional academic expedition? Remember to avoid the temptation of trying to talk students out of the things they believe in. The objective is to share a process of thinking and careful research. An instructor's questions and critique should be an attempt to strengthen the student's approach, not squelch their enthusiasm.

I once had a student who was interested in astrology tell me: "Those scientists and skeptics are so closed-minded. They'll never change their beliefs."

I said, "Do you think you are closed-minded?"

"Of course not. I'm not a scientist."

"So, you're willing to change your beliefs? Are you open to the idea that, perhaps, astrology is a lot of wishful thinking?"

She thought about this for a long moment and finally said, "Yeah, I guess that's real open-mindedness, isn't it?"

I pointed out that if she were truly open-minded she would read the skeptical objections to astrology, and try to come to an impartial decision about its merits. This is the fundamental intention of good science.

However, open-mindedness only works when it goes both ways. For most unconventional studies, completely clear and final solutions to the questions students want to answer do not exist. The best we can do as educators is to help them work on diligently thinking about their subjects, so when they are challenged by a skeptical inquiry they will have an educated response.

Acknowledgments

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Why Would People *Not* Believe Weird Things?

Instead of being appalled at the gullibility of the general public, perhaps we should be surprised that they believe so few *strange things. Compared to widely held religious beliefs and the even more astounding notions of physics, things like ESP, UFOs, and astrology seem rather plausible.*

WAYNE R. ANDERSON

Every issue, the SKEPTICAL INQUIRER carries articles decrying the absurd ideas that people commonly believe in: UFOs, ESP, dowsing, alien abductions . . . the list goes on. Two widely read recent books, Carl Sagan's *The Demon-Haunted World* (Sagan 1995) and Michael Shermer's *Why People Believe Weird Things* (Shermer 1997), recount the public's faith in all manner of strange phenomena.

The usual tenor of the skeptics to such reports is, "How can people prefer such far-fetched notions to the rational explanations of natural science?" As a teacher of college physics and astronomy, I have encountered most of these strange beliefs held by my students and have asked myself the same question.

Beliefs, of course, are not in-born but are shaped by the predominant culture. In American society, major influences

include religion, public education, and the popular culture of movies, television, music, and literature. Most of these influences encourage little or no skepticism, and many actually promote magical thinking. Yet as we shall see, the supposedly rational alternative, modern science, offers ideas that seem just as far-fetched as many of the claims of religion and pseudoscience.

Christian Claims

In December of each year, nearly a billion Christians around the world celebrate the birth of a Jewish charismatic leader whom they credit with, among other things, walking on water and turning it into wine, creating bread and fish out of nothing, and bringing dead people back to life. Furthermore, he himself was supposedly born from a virgin and came back to life three days after being executed. The sole evidence for any of these wondrous events is found in a single book, written decades after this leader's death by his followers, who were promoting him as divine. This same book also describes such things as a speaking bush, the miraculous parting of the Red Sea, and a person being turned into salt. Adherents of this faith are promised perpetual bliss after their savior returns to lead his angels in a titanic battle against the devil and his minions.

Such tales, unsupported by even a whisper of evidence other than the Bible, might be entertaining in a *Star Wars* movie. Their claim to truth should make any thinking person blanch. Yet hundreds of millions of people celebrate these acts without a hint of skepticism. But because they have been integrated into the dominant culture, most people do not view such beliefs as superstition or magic. Yet they are no less silly than many New Age ideas that get strong rebuttal from skeptics, including those writing in this magazine. To a society that uncritically accepts the veracity of such unreasonable stories, claims of alien abductions, channeling, or astrology can seem quite modest.

Pseudoscience

Americans grow up in a popular culture saturated with superstitions from around the world, embracing such beliefs as astrology, dowsing, reincarnation, Feng Shui, UFO cover-ups, alien abductions, and much more. We smiled when we learned that Nancy Reagan arranged her schedule (and that of the president?) on the advice of an astrologer, but we frown when we read that the police sometimes consult psychics in criminal investigations. As the following example illustrates, New Age beliefs are now promoted even by public institutions.

In an article in the *Sacramento Bee* entitled "SMUD Plugs its Workers Into Psychic Hotline for Safety," 6 November 1997, Carrie Peyton reported that a public utility company in Sacramento, California, hired a "counseling parapsychologist" to give a 90-minute presentation to its workers at one of its safety meetings. According to the newspaper report, this woman claimed that to her "ESP was a fact" and punctuated her talk with words like telepathy, clairvoyance, precognition, and dream states. She even gave a demonstration of telepathy and psychometry. When interviewed by the reporter, the people involved with this talk tried to backpedal, claiming that although they personally did not believe in ESP, they would try anything to get workers' attention. Nevertheless this woman was given the imprimatur of a respected public utility company. In the eyes of some employees and anyone they might talk to about this matter, the ideas proposed by this parapsychologist had as much validity as those that might be expressed at another such meeting if a physicist spoke about radiation hazards or a physician discussed the effects of stress on the immune system.

Cell theory revealed that complex systems are made up of simpler units, and germ theory showed that microorganisms, rather than the wrath of God, caused many diseases.

What makes this case even worse is that the person who arranged for this parapsychologist to speak learned about her by taking her noncredit course at a community college. Now how many people make a clear distinction between credit and noncredit courses? If it's offered by a college, it's a college course, and the college appears to be promoting pseudoscience.

If public institutions and even colleges sometimes embrace pseudoscience without skepticism, should we be surprised that the general public believes these things? Unfortunately this example is not an isolated case of the uncritical acceptance of such claims.

Rational Science

Against the unsupported ideas of religion and folk belief, science has staked its claim to provide a rational explanation of the natural laws by which the universe operates. And to a large extent this claim has been justified. In biology, the study of anatomy has uncovered an underlying unity to the structure of animals. Cell theory revealed that complex systems are made up of simpler units, and germ theory showed that microorganisms, rather than the wrath of God, caused many diseases.

Newtonian physics, developed near the end of the seventeenth century, proved to be the most rational of all the sciences. In a rigid chain of cause-and-effect, Newton's three laws of motion, coupled with his principle of universal gravitation and the newly developed calculus, were able to explain everything from falling apples to the motion of celestial bodies. The universe was reduced to a great clock ticking away according

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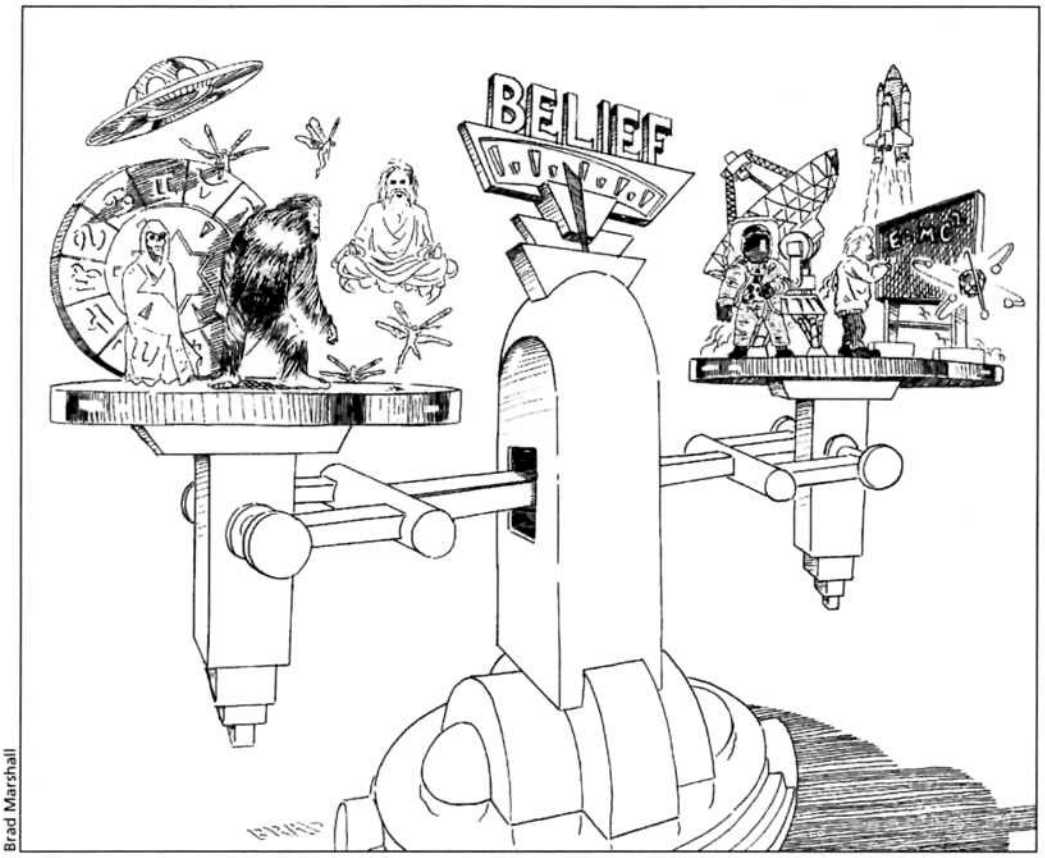

Brad Marshall

to the immutable dictates of rational mathematical laws. During the nineteenth century, Newtonian principles were used to deduce the laws of thermodynamics and explain the behavior of gases. The work of Faraday, Maxwell, and others led to a theory of electromagnetism which further extended the scope of a naturalistic account of the world.

To some, the creator of the universe was seen as little more than the "first cause" who then stood back and watched it all unwind according to his laws. He took no part in the workings of the world and became somewhat irrelevant.

Admittedly the new scientific developments introduced some rather strange concepts that were not obvious to the ordinary person. Cells could not be seen with the naked eye, but they showed up clearly under a microscope. Electric and magnetic fields were invisible, but their effects could easily be demonstrated using ordinary magnets, wires, and iron shavings. Molecules could not be seen at all, yet they "made sense" because the invisible microscopic world was thought to be a scaled-down version of the observable world of the senses. Its constituents obeyed the same laws as ordinary objects.

Irrational Science

For more than 200 years, the rational ideas of science generally reflected people's experience. The major principles could be demonstrated to lay audiences, and in fact public lectures on science were well-attended in England by citizens attempting to understand the latest discoveries. But the course of science in the twentieth century, with the growth of Darwinian evolution in biology and quantum mechanics in physics, has moved further and further away from the realm of experiences open to even the well-educated layman.

On the face of it, evolution by natural selection provides a logical explanation for the development of life on this planet. However, to account for all of the enormous complexity in life forms by random genetic variation requires an act of faith by most people. Myriad genetic changes must have taken place over an immense span of time for such evolution to have occurred. For a society in which many people don't understand events that occurred even a decade ago, such profound depths of time are beyond the comprehension of most people.

But an even greater problem precludes acceptance of evolution: *Almost everything it tells us we do not want to hear.* Evolution says that we came out of some primordial slime, that our presence here is due to a series of genetic accidents, completely devoid of meaning and purpose. It even implies that the ultimate origin of many of the things we treasure most, things like beauty, justice, and honor, is really nothing more than mechanical competition between genes. How many people can find such a view sustaining and adopt it as a major guiding force in their lives? Is it any wonder that most people prefer the reassurance of traditional religion or the more "modern" sounding ideas of New Age spirituality?

For more than two centuries, physics practically defined the word rationality. Yet much of twentieth century physics sounds far less reasonable than many New Age beliefs. Let us examine some of the modern theories.

The Structure of Matter

Atoms and molecules—even protons, neutrons, and electrons—were plausible because at first they seemed to be scaled-down versions of ordinary objects. But now protons, neutrons, and most of the other subatomic particles are believed to be composed of particles called *quarks* which cannot be separated and therefore are not even observable in isolation.

In an attempt to understand the ultimate nature of quarks and other fundamental particles, a promising theory has emerged during recent years. It is called *string theory* and has

been hailed by its proponents (and detractors) as a "theory of everything." In its latest version, *M-theory*, strings have been replaced by membranes that vibrate in a ten-dimensional space. Most of these dimensions are so highly curved in on themselves that we experience only the ordinary three dimensions of our familiar world. Interactions between these membranes may even have produced space and time themselves. A recent article in *Scientific American*, intended to explain this theory to the public, contains such terms as *S-duality, T-duality, the Planck length, p-branes,* and the $E_8 \times E_8$ *heterotic* (Duff 1998).

The Laws of Nature: quantum mechanics

Although the deep meaning of quantum mechanics—the theory of the microscopic world—still evades physicists, they are at least familiar with the experimental evidence for it and the reasoning that leads to its bizarre conclusions. The general public, on the other hand, must accept most of it on faith. For example the vacuum, which most people think of as complete emptiness, is viewed in quantum mechanics as a boiling sea in which subatomic particles spontaneously appear out of nothing and then suddenly vanish before we can observe them. Physicists call them "virtual" particles to distinguish them from "real" particles which can actually be captured and observed.

The very notion that science is studying a real world that exists independent of us has been called into question. According to a common interpretation of quantum mechanics, sub-atomic particles such as electrons do not have a well-defined existence until we try to observe them. They exist in *all possible states* until our act of observation forces them into one particular state. This phenomenon is called the "collapse of the wave function." In other words, there is no real world until we try to observe it. Einstein, who never did accept this view, posed the question something like, "Do you mean that the moon does not exist until I look at it?" Quantum physics appears to say it does not. In attempting to make sense of this bizarre idea, some physicists have adopted the *many worlds* view. According to this idea, each observation forces a system into one of its possible states. But what about all those other states? In the many worlds theory, each observation causes the universe to split into two or more universes, one in which the system has the observed state and the others in which it has the other states. Since millions of observations are going on all the time, the universe is constantly splitting into innumerable other parallel universes. To some physicists, these other parallel universes are just mathematical possibilities. But others think that they are perfectly real, meaning that our universe is embedded in a vast sea of universes increasing apparently without limit.

Another implication of quantum mechanics seems to be that specially prepared particles, called "entangled" particles, may be able to communicate with each other at speeds greatly exceeding that of light in some mysterious way over immense distances (Branning 1997). In a newspaper article attempting to explain this weird behavior, Timothy Ferris, one of the very best of current science writers, suggested in the October 20, 1996, *Sacramento Bee* that such faster-than-light communication may be due to interactions between our world and another universe traveling backwards in time.

Origins

The Bible says: "In the beginning God created the heaven and the earth . . . And God said, Let there be light: and there was light." Big Bang cosmology says: In the beginning was a hot ball of energy of near-infinite density that exploded. An infinitesimally small part of that ball suddenly underwent a tremendous inflation for about 10^{-30} second. Afterwards some of the energy turned into quarks, which combined to form protons and neutrons. Galaxies, and then stars and planets, condensed from this matter.

In a nontechnical article explaining the inflationary part of this expansion, the authors write, "In the quantum version of the model the false vacuum is not absolutely stable. Under the rules of the quantum theory all the fields would be continually fluctuating . . . a quantum fluctuation would occasionally cause the Higgs field in a small region of space to 'tunnel' through the energy barrier, nucleating a 'bubble' of the broken-symmetry phase. The bubble would then grow at a speed that would rapidly approach the speed of light, converting the false vacuum into the broken-symmetry phase" (Guth and Steinhardt 1984).

Science Versus Pseudoscience

Let us now look at a few common pseudoscientific ideas and see how they stack up against "real science."

Numerous polls indicate that many Americans believe that UFOs are actually alien visitors from space, and according to the December 1996 Harper's Index, 49 percent of us even think that the government is concealing evidence of such visits. Many skeptics love to ridicule this belief as being totally irrational. Yet consider these points: The government does try to conceal things from us. Many scientists think that life may be widespread throughout the galaxy, and some well-known astronomers have even made considerable efforts to detect signals from extraterrestrial civilizations. Space flight is certainly possible; we have gone to the Moon and are planning a visit to Mars in the twenty-first century. So in light of these points, why is it so preposterous that we have been visited? To the general reader, the idea that alien spacecraft might be traveling around our galaxy is no less reasonable than walking on water, another universe traveling backward in time, or human consciousness evolving from primordial molecules.

Astrology is another example. In general terms, astrology is the belief that, in some mysterious way, the state of the rest of the universe affects us. This belief is not so different from the quantum mechanical notion that our observation of an electron causes its wave function to collapse and therefore forces the electron to be in one particular state. Instead of the rest of

NOT *BELIEVING WEIRD THINGS*
continued on page 62

Starkle, Starkle, Little Twink

There is an informal, effective way to challenge astrology that is neither a disdainful dismissal nor a tedious, scientific recital. It is just a matter of asking some simple questions.

JUDITH HAYES

The full quote is, "Starkle, starkle, little twink; who the hell you are, I think?" Uttering these words of drunken contemplation is a pudgy cartoon character, holding what surely must be his sixth or seventh martini. His heavy-lidded eyes gaze out soporifically, as numerous bubbles, surrounding him like a halo, complete the picture. This tiny bit of tomfoolery appeared on a cocktail napkin in the San Francisco Bay Area somewhere around 1980.

She's quoting *cocktail napkins?!* you may rightly ask. Well, yes, actually I am. Contemplation of the stars, drunk or sober, has been a preoccupation with humankind since our inception. It seems to be one of the first things we humans ever set our minds to. And with good reason.

The night sky is a glorious, intimidating, curious thing. Many humans, over many millennia, have gazed up at the

stars and wondered, "What the heck *are* those things?" And for so many millennia, people hadn't a clue. Humans thought up some very creative explanations for the stars. They were holes in the sky where light peeked through from the brilliant heaven above that sky. They were the campfires of thousands of other hunting clans, just like ours—except they were very, very far away. They were the night-lights of the gods. Although we had no clear answer, humans were determined to come up with the right explanation for this enigma.

Those few stars that refused to stay put complicated things for our remote ancestors in this already puzzling mystery. Now why would a handful of stars, among all those thousands, behave that way? Night after night, as the canopy of stars moved majestically and predictably across the sky, there were always those few rebels who refused to go along with the rest. It was eerie.

And if you looked very closely, some of these rebels looked quite different from the rest of the vast array. For one thing, they didn't seem to twinkle like the others. And one of them, on certain nights, actually looked as if it were red. Then there were those two brilliant rebel stars that were always so low on the horizon at sunrise and sunset, that were often more bright than any other star in the sky. These were deep mysteries indeed.

We finally did figure out that the brilliant morning and evening stars were one and the same—Venus. And some of us ultimately realized that these rebels were not stars at all—they were gods, a logical deduction if ever there was one. Well, that turned out not to be the right answer. But once we concluded that these "wandering" stars were in fact planets, we set about the exciting business of interpreting their bizarre motions in the heavens, and how these meanderings might affect us. Thus, astrology was born. And we have been happily engaged in it ever since.

For almost as long as astrology has existed, there have been cogent arguments put forward exposing its fatal flaws. Once the real distances to the planets had been fairly well calculated, and gravitation was more or less understood, these arguments carried even more weight. How could planets, hundreds of millions of miles away from us, have any effect on a newborn baby? Logically, they could not. But logic has never been our strongest suit. Consider:

According to statistics quoted in *Life* magazine (July 1997), 48 percent of Americans say that astrology is valid; in the last twenty years the number of astrologers has increased from around 1,000 to 5,000; and 20 million books on astrology are purchased annually in this country alone. Helping to feed this silliness, and very unsettling to a skeptical thinker, is the fact that the *Life* article author concluded with a ringing endorsement of astrology (see "*Life* Magazine's Star Struck View of Astrology," SKEPTICAL INQUIRER, November/December 1997).

We seem to be galloping backward. It's as if we just can't wait to return to the Middle Ages, when illnesses were often treated with exorcisms, witches really flew on broomsticks, and the stars unquestionably ruled our destinies with a firm hand. Christian fundamentalism is on the rise and comets are again being perceived as messengers from God, at least in certain sections of San Diego, California.

Judith Hayes

So what do we do, other than wring our hands and gloomily anticipate a real, widespread return to medieval thinking? On a personal level, there is much we can do, if we all jump in and give it a try. Undoubtedly you know at least one person who believes in astrology. And though you may not be able to disabuse your believing friend of that cherished belief, exchanges such as the following can be fruitful dialogues, especially if witnessed by several astrology adherents. These conversations will be far more successful if you avoid condescension and patronization. You can, instead, gently nudge your friend to examine his or her own beliefs.

This sort of amiable interaction can do more to encourage critical thinking than quoting all of the actuarial statistics and probability studies put together. You can argue probabilities, statistics, and the laws of universal gravitation until your believing friend begins to doze off, but in the end it's always the same. *I don't care about statistics! I am a Libra, and that describes me to a "T"!* So, there is another way to challenge astrology. In a light, conversational manner, you can ask some simple questions.

Almost no one understands "the precession of the equinoxes." Almost everyone understands "the stars have moved." Without sounding pretentious, you can ask your Libra, "Did you know that the stars have moved since astrology was invented? Yeah, the constellations have all moved, relative to us, quite a bit in the last 2,000 years. So, the planets no longer move in the constellations that way that astrologers say they do. Doesn't that change everything?" The response will likely be a blank stare, followed by a defensive, "*That doesn't change the fact that my horoscope fits me absolutely perfectly!*"

You can then ask about Hitler. Many people had to have been born at the precise moment that he was. Does that mean those people had more in common with Hitler than with their own friends and family? And then of course there is Stalin, Attila the Hun, Charles Manson, John Wayne Gacy, Ivan the Terrible . . . well, obviously this list will be very long. Will all those millions who were born at the same time somehow be soul-mates of these monsters? If not, why not?

Personalize it. Say to your female friend, for example, "Let's

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assume you were born at precisely the same moment as a male, poverty-stricken, Venezuelan farmer/turned bank robber/turned state prisoner. Do you really believe that you have far more in common with him than you have with me, a female, your chosen and thus far unincarcerated friend, who works in the same office you do, and likes the same rock music?" The "yes" you receive to this one should be rather shaky.

Another rumination worth expressing is, "You say you're a Libra. Since there are six billion people in the world, and only twelve signs of the Zodiac, that means there are about 500,000,000 Libras in the world alive today. And if you add the countless billions who have already lived and died, there have been billions of Libras. What could you possibly have in common with all those billions, who lived in wildly different climates, eras and cultures, that you don't have in common with me?" This question is usually a stumper.

Another good question: Who decided which birthdates corresponded with which characteristics? You will no doubt get a response such as, *It was slowly accumulated, ancient knowledge.* So then ask how the ancients who created astrology could categorize *all* humans, when they weren't even aware of the existence of humans on the other side of the planet—the Americas, for example. How could they be sure their horoscopes would apply to those unknown humans? *All humans have similar human traits.* Well, if that's true, then there really aren't any zodiacal differences between any of us, are there? *Yes there are. No matter how big the numbers, the differences are there.* Hmmm. Well, then, whoever it was who determined what these differences are—was he inspired by God? If you don't know who determined these things, or when, or how, then how can you be expected to believe it?

The useful tactic of pointing out the unambiguously conflicting horoscopes offered by different astrologers for the same individual will probably elicit the statement that some astrologers are just not good at their trade—as happens in all vocations. You then might want to cite the 1985 University of California test conducted by physicist Shawn Carlson (SKEPTICAL INQUIRER, Spring 1986, 194–196; also Randi 1993, 99). He tested thirty astrologers who had been represented by the American Astrological Association to be the "best" in the trade. Their task was to match horoscopes with people, and they got it right in only 33 percent of the 116 horoscopes. Pure chance would produce equal results, as would tossing a coin. Does your friend have an explanation for such a surprising outcome? And just how do we find out which astrologers are "good?" What is the litmus test? Is astrology a talent that is magically acquired by unknown means? Believers in astrology are reluctant to associate the word "magic" with astrology, but if they can't offer a better explanation, they're stuck with it.

Identical twins have been known to be very different. How can this be, you ask? The response is usually a vague shrug, but you can gently press for an answer. The answer should sound hollow even to the person offering it.

These sort of exchanges are almost always worth the effort. In striking a blow for rationalism, you never know when you might plant that one seed of doubt that may someday blossom into the intellectual flower known as critical thinking. It's certainly worth a try.

However, if, even after all of this, your friendly attempts come to nothing, with no minds changed and no seeds planted, don't be too discouraged. It's probably just the way things were meant to be. Perhaps it was written in the stars.

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Of Planets and Cognitions:
The Use of Deductive Inference in the Natural Sciences and Psychology

Inferences of unobserved cognitive events in psychology are not the same as the inference of the recently discovered, but unobserved extrasolar planets in astronomy. Unlike astronomy, or the other natural sciences, psychology has no experimental foundation of laws that justify such inferences.

HENRY D. SCHLINGER JR.

Magazines such as the SKEPTICAL INQUIRER encourage skepticism of beliefs and claims, ranging from the extraordinary to the quotidian, that often characterize the so-called pseudosciences. Unscientific claims also occur frequently within established disciplines such as the social sciences, in which it is fairly easy to engage in biased judgment and illogical thinking. To understand the ease with which belief can transcend science, one need only examine such false claims as facilitated communication and repressed memory syndrome, not to mention more entrenched beliefs such as psychoanalytic personality theory. Even the natural sciences are not immune to this problem, because humans are fallible and their judgments can often be clouded by personal beliefs, even in the face of contrary scientific evidence.

What distinguishes the natural from the social sciences,

however, is that in the natural sciences there is a self-corrective mechanism inherent in the scientific methodology.

Because the social sciences lack such a mechanism, scientifically questionable claims and beliefs have a much longer life than those in the natural sciences.

As one who believes that psychology can and should be a natural science of behavior, I am uneasy with the fact that much of modern psychology is based upon unobservable mental events. Some psychologists may insist that inferring such events is an unavoidable pitfall of a discipline in which the area of study has historically been the mind. Others may argue that psychology simply emulates the natural sciences, where inferences are regularly made about unobservable events. A recent example in astronomy provides an opportunity to compare inferences in psychology with those in the natural sciences.

In October 1995, astronomers at the Geneva Observatory in Switzerland announced with much scientific and media fanfare the discovery of the first planet outside our own solar system. The planet is in a tight orbit around 51 Pegasi, a star in the constellation Pegasus. Just three months later, astronomers at San Francisco State University and the University of California at Berkeley announced the discovery of two other extrasolar planets orbiting the stars 70 Virginis, located in the constellation Virgo, and 47 Ursa Majoris. The astronomers speculated about the orbit and minimum mass of each planet, but could offer no other details because the planets themselves had not been directly observed.

The initial response from the scientific community was rightly one of skepticism—these were, after all, potentially momentous discoveries that required verification. Other astronomers later replicated the initial observations and measurements, although still without observing the planets directly. Although the 51 Pegasus report was strongly questioned, researchers have now inferred by similar means the presence of at least eight planets outside the solar system. Of course, it is not possible for the astronomers to have observed the planets given the available technology, because the planets' suns are too bright to allow reflected light from the planets to be seen. But if one of the axioms of scientific methodology is objective observation, then it is not unreasonable to ask: How can scientists accept these claims without direct observation?

(In late May 1998 NASA announced that the Hubble Space Telescope may have taken the first image of a planet outside our solar system, an object 450 light-years away in Taurus designated TMR-1C. That is an exciting possible discovery, but it doesn't affect my general point. Most expected extrasolar planets will remain beyond Hubble's optical reach.)

The answer is that the discoverers of these extrasolar planets applied a form of deductive inference based on scientifically proven laws and principles. Beginning with Galileo and Newton, scientists have made direct observations of visible bodies and the forces they exert on one another. After conducting experiments on the motion of objects on earth, scientists were able to extrapolate the discovered laws to celestial bodies. For example, as David Palmer at Smith College points out, Isaac Newton explained the effects of the moon's gravitational pull on ocean tides using his laws of motion even though he obviously never carried out direct experiments on ocean tides. Nevertheless, we accept his interpretation as a plausible explanation based on the strength of the laws of physics he discovered under more controlled conditions.

The experimental findings of Galileo and Newton have been formalized as the laws of motion and the theory of gravity which explains them. With these laws as a scientific foundation, the discoverers of the extrasolar planets were justified in deducing, and inferring, the existence of the planets based on observations other than those of the planets themselves; namely, slight inconsistencies in the pulsations of the stars around which the planets orbit. According to David Black, director of the Lunar and Planetary Institute in Houston, scientists scrutinize a star for signs that it is affected by the gravitational tug of an orbiting planet. As the planet moves from one side of the star to the other, its gravitational pull moves the star back and forth. Astronomers are able to detect this effect as a slight wobble in the star's overall movement across the sky.

The practice of deductive inference is an integral part of the natural sciences, such as molecular biology and astronomy, especially when the objects of interest are undetectable by the naked eye. The use of, and thus the credibility of, deductive inference in science depends on the prior discovery of reproducible cause-and-effect relationships between variables in the subject matter. From this collection of facts, scientists induce the laws or principles from which they can then deduce, or predict, the existence of phenomena that have not yet been or cannot yet be subjected to experimental analysis. For example, James Watson, Francis Crick, and their colleagues deduced what is arguably the greatest biological discovery of the twentieth century. They discovered a theoretical model of the likely structure of the DNA molecule, based on the known laws of chemistry and biology.

Most historical and contemporary psychological theories are largely deductive in that they infer unobservable processes. These inferences about unobservable cognitive (from "cognition": the act or process of knowing) processes are offered to explain how individuals obtain knowledge about their world. The history of psychology is replete with inferred, unobservable phenomena, including the id, ego, and super-ego, the mind, the self, personality, memory, and consciousness, among many others. In the most recent model of psychology—the information-processing model—cognitive processes are likened to computer hardware and software functions and then treated as if they possessed the same properties. For example, memory is conceptualized as representations of experience (input) which are stored (processed) and then retrieved at the appropriate time (output).

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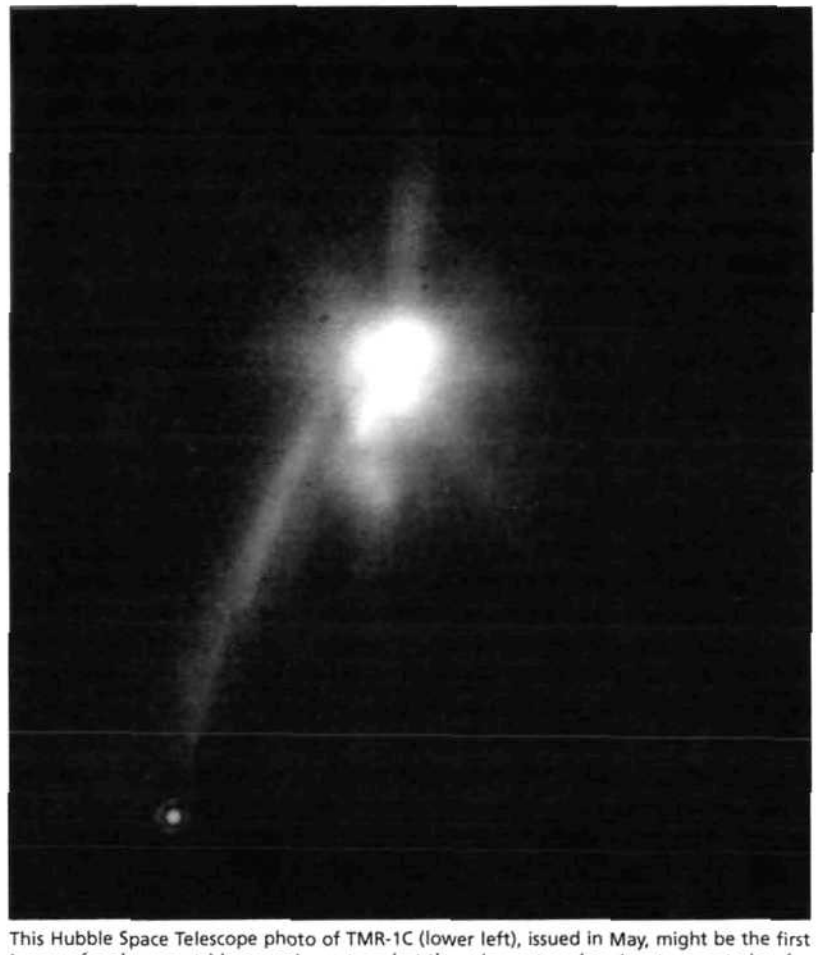
In psychology, the inaccessible realm is inside the individual, and theorists deduce the existence of unobservable events—cognitions—solely from observable events—behavior. But *we cannot conclude that this form of deductive* inference is similar to that practiced by astronomers or is, in fact, valid at all, without showing that the deductive inferences are derived from scientific, lawful relationships *between objective variables. Since most psy*chological theories do not have a solid scientific foundation, there remain substantive differences between much of psychology and the natural sciences, like astronomy. In psychology, *cognitive events are not deduced from an* experimentally established foundation of lawful relationships between objective events. Moreover, the inferred phenomena of astronomy, (such as extrasolar planets), are potentially *observable with improvements in technology,* whereas cognitive structures and processes simply are not.

With very few possible exceptions (e.g., behavior analysis), there exists in psychology *no systematic body of laws or principles, no* basic units of analysis, and not even a commonly accepted methodology for investigating behavior from which credible deductions about unobservable events could be made. If *psychology is to advance as a science, then it* must emulate the natural sciences in substance as well as form. Then, and only then, can deductive inferences be made about unobservable events on the assumption that they possess some of the *same properties as events already verified through observation* and experimentation.



This Hubble Space Telescope photo of TMR-1C (lower left), issued in May, might be the first *image* of a planet outside our solar system, but the other extrasolar planets reported so far have been inferred from evidence based on physical principles. (S. Tereby and NASA)

But, for now, it seems that many psychologists borrow from the natural sciences only the part of scientific conduct that is most convenient—the deductive inference—without doing *the necessary groundwork. But why? One reason is that per*haps human behavior really is a different subject matter requiring a different approach—one in which deductive inferences precede the discovery of the basic cause-and-effect relationships upon which they are usually based. However, this reasoning tends to defy scientific standards.

A more likely reason is that much of psychology is still mired in the philosophy from which all sciences originated and, although there are many notable exceptions,[1] psychologists in general don't receive the years of training in science, in particular the laboratory work, that would force them either to be much more conservative with their speculations, or to suffer the angst that comes from going out on an inferential limb without the trunk of hard-earned data to support them. Also, psychologists, like the rest of us, have grown up in cultures in which speculation about unseen mental events has been a common practice for a very long time. Whereas prescientific language in the natural sciences has long since disappeared from the scientific vernacular, the ordinary nonscientific language of psychologists and others regarding human behavior is still alive and well. Whatever the reason, let us not forget that the use of deductive inference in much of psychology is at best a facsimile of the kind of deductive inference used by scientists like those who recently made the momentous discovery of planets outside our solar system. And to join the ranks of true scientists and affect the world in ways like Galileo, Newton, and their descendants, psychologists need to take a giant leap forward.

Note

1. Despite my general point, some areas of psychology—e.g., physiological, perception, and learning—operate much like other sciences, and the researchers do have many years of training in science, particularly in laboratory work.

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When Our Movements Seem Mystical

CAROL TAVRIS

Nonconscious Movements: From Mystical Messages to Facilitated Communication.
By Herman H. Spitz. Lawrence Erlbaum Associates, New Jersey, 1997. 202 pp.

Everyone in the field of mental retardation, and for that matter every student and teacher of psychology, should read this smart, informative, fascinating little book. If you persist in reading this review instead of rushing off to your bookstore, I'll try to explain why I make such an extravagant recommendation.

For many years, Herman H. Spitz has been investigating claims of new pedagogical and psychological methods for raising the intelligence of people with mental retardation. "Alas," he writes (p. vii), "I found no magic cures; what I found instead was an astonishing variety of human behavior on the part of those making the claims, ranging from outright fraud to honest self-deception." When facilitated communication (FC) came along, Spitz recognized another "popular delusion [that] was happening not in the past but right before our eyes, presenting an opportunity not to be missed" (p. vii). Spitz recognized that the basis of FC was the simple, universal, but widely misunderstood phenomenon of involuntary muscle movement—in this case, the unconscious movement of the "facilitator's" hand over that of the child with autism.

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Involuntary (unconscious) muscle movements are ubiquitous and normal; they are essential to survival. You couldn't live a day if your conscious mind had to process all the things your body is doing at any given moment—uncrossing your legs so your knee doesn't go numb, adjusting your shoulders while you sit at the computer, waving your hands to emphasize an argument, nodding your head ever so slightly (or shaking it in disapproval) while you listen to a friend's latest adventures, driving the car while your mind worries about a deadline. Many nonconscious movements are minute, even unobservable: a dowsing rod eventually bends down not because it has found water, but because the hand holding the rod becomes fatigued. Likewise, Clever Hans—the turn-of-the-century "thinking horse" who allegedly had astonishing mathematical talents—was a clever horse, all right, but not at math. He was clever at reading the slight involuntary head movements his human observers made when he pawed the right answer.

We are so oblivious to most of our physical movements, especially when our attention is diverted elsewhere, Spitz argues, that many people refuse to believe they occur at all—or they ascribe these movements to "other worldly beings or to mysterious forces that have escaped scientific scrutiny" (p. 26). When facilitators deny that they are influencing the responses of autistic children, Spitz notes, they aren't lying; they really believe it. Likewise, he notes, "Automatic script writers, Ouija board users, and facilitators do not consciously know what they write and deny that they are directing the writing. Pendulum holders reject the idea that they move the pendulum and dowsers that they move the branch. Table movers believe that they follow, not move, the table. Mind-readers make use of the fact that their guides unwittingly generate muscle movements that can be read by a sensitive and skillful muscle reader . . . These follies never end" (pp. 100-101). Indeed they don't. Today, for instance, there is renewed enthusiasm over dowsing rods, not for finding water but for almost everything else. People are dowsing for stock market buys and to make the "right" selection in personals ads!

Spitz sets out to understand the reasons that most facilitators refuse to believe that they are unwittingly guiding their partners, and the reasons that the people who promote FC continue to deny the "clear objective evidence" (p. 24) that the method is a sham. His quest takes him on an enlightening examination of FC's all-too-numerous historical and contemporary relatives: the many delusions and outright hoaxes that have been perpetrated by people who fail to recognize (or who intentionally disregard evidence of) the ubiquity of non-

conscious movements.

Nonconscious Movements consists of eight chapters. The first four concern phenomena produced by involuntary muscle movements: a detailed and damning analysis of facilitated communication; a history of Clever Hans and Lady the Wonder Horse, who supposedly could receive messages telepathically (you will learn far more about the fascinating story of Clever Hans and his handlers, by the way, than you ever got in introductory psychology); a discussion of the mechanisms shared by facilitated communication and clever horses; and "Other Phenomena," such as pendulums, mind-reading, table moving, dowsing, Ouija boards, and automatic handwriting. Chapter 5 reviews scientific studies of involuntary muscle movements. Chapter 6, "Additional Psychological Mechanisms Relevant for Understanding Facilitator Behavior," explores possible reasons for the alarming number of false allegations of sexual abuse that facilitators have communicated. Chapter 7 reviews the normal cognitive processes that make people receptive to beliefs in FC and its relatives, including the self-fulfilling prophecy, cognitive dissonance, and biases of self-deception. Chapter 8 is a brief conclusion.

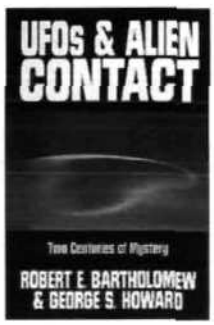
Chapter 6 is the most provocative and debatable chapter, as Spitz acknowledges. What, he asks, is going on in the conscious and unconscious motivations of the facilitators who make up unfounded charges of sexual abuse? Spitz considers "surface" explanations, based on behavioral principles such as reinforcements, as well as "depth" explanations, based on nonconscious motivations.

Some facilitators, he believes, are driven by motives that are hardly mysterious: Making dramatic accusations through the method of FC gives them a means of controlling others, exacting revenge on parents and colleagues (via accusations supposedly made by the autistic child), and getting attention and power. Other facilitators, he believes, may be releasing the "conflicting and troubling feelings that resulted from their own abuse" (p. 159). And many are acting out a self-fulfilling prophecy; in their training, many facilitators are actually told to expect their students to raise charges of abuse.

According to Spitz, facilitators fall into a form of dissociation, using the keyboard like a form of automatic writing (a phenomenon in which subjects in a trance, under hypnosis, or another "altered state" produce poems, writing, or images of which they are unaware). For Spitz, dissociation, like involuntary muscle movements, is another result of the adaptation during evolution of a subconscious capacity to process information and perform activities without clogging up consciousness. In my view, Spitz tries to do too much in this slight chapter, digressing into dissociative versus sociocognitive theories of multiple personality disorder and false memory syndrome. But I completely concur with its conclusion: that "the founder and disseminators of facilitated communication created a fertile breeding ground for automatic writing in which a ventriloquist communicates through a live mannequin who cannot speak out in denial. If we were asked to design conditions in which individuals could unwittingly release inner material of which they were unaware or which they would not have released under ordinary circumstances, we could do no better than invent facilitated communication . . ." (p. 157).

In spite of the mountain of empirical evidence that has discredited it, Spitz warns, FC "continues to spread like a virus run rampant" (p. 175). Its proponents don't back down because they are eager to protect their livelihoods, reputations, and self-esteem, and undoubtedly too because they are scared to face the disappointment and wrath (not to mention lawsuits) of parents and educators if they say, "we were wrong."

These vested interests and face-saving denials of incontrovertible evidence are the reason, Spitz correctly observes, that further research discrediting FC "will simply fall on deaf ears" (p. 167). Precisely — which is why it is so important for the rest of us to be listening. Spitz's book is important because students and professionals alike need to be reminded that FC is only the latest—but not the last—in a long line of hoaxes, to which we are all vulnerable if we do not use reason and evidence to counterbalance our human longing for easy cures, quick fixes, and miracles.



The Social Psychology of UFO Sightings and Beliefs

ROBERT A. BAKER

UFOs & Alien Contact: Two Centuries of Mystery. By Robert E. Bartholomew and George S. Howard. Prometheus Books, Amherst, New York, 1998. ISBN 1-57392-200-5. 408 pp. Hardcover, $26.95.

Without question, sociologist Robert Bartholomew and social psychologist George Howard have compiled one of the best collections of UFO reports, alien contact claims, and reports of alien abductions available thus far. Every serious student of UFOlogy should read and ponder their meticulously researched and carefully documented historical account of "strange things in the sky."

Although most of us have assumed that the UFO phenomenon is a rather recent occurrence, the authors quickly inform us that UFO sightings are "logical extensions of a social phenomenon that has been emerging for more than one hundred years . . ." Part 1 is devoted to many examples of "airship mania" and other instances of wishful thinking and social delusions regarding "things in the sky" beginning with "The Great

American Airship Mania of 1896–97," in which thousands of citizens reported seeing cigar-shaped craft with wings and propellers and an attached undercarriage with human occupants floating across the skies. Boosted by press sensationalism, many people across the nation were reporting strange sightings, weird encounters, and bizarre events surrounding various forms and sorts of "air machines."

These events are easily understood if one is familiar with mainstream theories of social psychology. First of all, eyewitness testimony is notoriously unreliable and subject to error. Secondly, a person's mental set or frame of reference strongly influences how external events are interpreted and internalized as reality. Further, under ambiguous circumstances and viewing conditions, misidentifications are common. The fallible nature of human perception when colored by suggestion and the pressure of social consensus makes it easy to understand why so many people were deceived. Since the real world was on the cutting edge of manned flight, it is certainly understandable that so many people were expecting to see ships in the air.

Near the end of the airship mania period in 1897, Thomas Edison began experiments involving telegraphy and two balloons sent aloft at night. Hearing of this experiment, hundreds of citizens at numerous locations across the nation reported seeing a giant imaginary arc lamp suspended in the sky. Again, the installation of "electric lights" across the country was the source of inspiration for this social delusion.

The United States was not alone at this time in reporting aerial delusions. Hundreds of sighting of ghost balloons were reported in Canada after press reports of plans by the Swedish scientist Andree to navigate by balloon to the North Pole. A few years later, in 1909, shortly after the Germans developed the zeppelin, the British began to feel vulnerable to attack and worried that their long-held military and naval superiority was lost. The result? In New Zealand between July and September, thousands of New Zealanders reported seeing zeppelin-type dirigibles. Then, in the winter of 1909–1910, residents of the New England seaboard were convinced that the world's first practical heavier-than-air flying machine had been perfected because thousands of people reported seeing it sailing through the skies. Next, in 1912 and 1913 a collective delusion lasting for a period of over five months occurred in Great Britain. This delusion also involved the mass sightings of imaginary zeppelins and was precipitated by the German armament buildup and widespread press speculation.

Then, shortly after the outbreak of World War I, people's vivid imaginations gave birth to a series of wild rumors about German subversion and sabotage both in the U.S. and Canada. The German scare in the U.S. reached such proportions that streets with German names were renamed, anything German was prohibited, and many people of German ancestry were placed in internment camps. This panic led to many people seeing airplanes in the skies over Canada, America, and even South Africa carrying out air raids between 1914 and 1916. After America's entry into the war in 1917, National Guardsmen in New Hampshire fired at aeroplanes supposedly carrying out an air attack. After World War I there were, indeed, many many things seen in the sky as aircraft and air travel proliferated. But reports of nonexistent aerial phenomena died down until 1946, when thousands of Swedish citizens reported seeing remote-controlled German V-rockets crossing Sweden's skies. Rumor had it that these missiles fell into Soviet hands at the end of World War II and they were merely the prelude to a massive Soviet invasion. Despite the massive publicity supporting this possibility and reports from hundreds of eyewitnesses, no concrete physical evidence of such missiles was ever found.

A year later, in 1947, the modern era of UFOs and flying saucers began with the report by Kenneth Arnold, while flying near Mount Rainer on June 24, of what appeared to be nine glittering objects, flying in formation at incredible speed. When Arnold reported his sighting to newsmen, one of them referred to the objects as "flying saucers." The name stuck and within a few weeks reports of saucers and unidentified flying objects came in from all across the nation. An August 1947 Gallup poll revealed that 90 percent of Americans surveyed were aware of the flying-saucer sightings and that most believed that U.S. or foreign secret weapons, hoaxes, and balloons were responsible. Soon, however, the popular press began to bombard the public with magazine articles, books, and newspaper stories suggesting that the saucers were extraterrestrial in origin and were being piloted by aliens who were here to help earthlings survive the dangerous nuclear age.

In the 1950s, as more and more people began to report sightings and contact with extraterrestrial craft and their occupants, most of these individuals were considered to be either irrational or psychologically disturbed. The authors point out that this stigma has continued despite repeated scientific findings that human perception is unreliable, eyewitness behavior untrustworthy, and social psychological theory can easily account for mass UFO sightings. When the fact that visual hallucinations occasionally occur to normal people is considered, there is really little reason to assume the people who see and report UFOs are either irrational or psychotic.

Bartholomew and Howard also note that for many many people the widespread belief in extraterrestrials is a thinly disguised attempt "to resurrect the power and function of God within a plausible rationalistic framework. In other words, UFOs seem to be a substitute for God." As for crashed UFO stories, the authors say these are the substitutes for legends and folktales of earlier times and they "contain a poignant message about our secular age, in which science and reason

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have expelled gods, ghosts, and demons from our minds, quickly replacing their absence with more plausible and equally compelling contemporary themes to stimulate our imaginations: complex government conspiracies and alien creatures. That many people envisage such an exciting and wondrous universe over a godless, aimless, mechanistic existence should come as no surprise."

In summary, the authors see the UFO phenomenon as a classic example of a mass delusion marked by feelings of threat to the community, attempts to flee from the threat, collective wish-fulfillment, and small group scares. The Betty and Barney Hill event, the Taylor family in Kentucky episode, and the experience of the Knowles family in western Australia are seen as good examples of "small group" scares.

For my money, Part II of the book is by far the more interesting and valuable. Here, according to the authors, the fundamental assumption is that we have *not* been contacted by aliens and that based on the evidence to date there is no clear evidence of alien contact that is "acceptable to the general scientific community . . . There are a small number of scientists who claim to have proof or believe the evidence favors the existence of aliens, but we are referring to the majority of the scientific community." The next chapter, "In Praise Of Foresight and Fantasy," argues that without bold, creative scientific fantasies the achievements of modern science would not be possible. Moreover, the authors insist that the old "objectivist" ideas of "truth" and "reality" no longer hold and that we should think of "scientific evidence as a possible truth that is created when the world (or specific entities such as human beings or aliens) is approached from a particular system of beliefs . . . Does science tell us the truth (the complete truth and the final truth) about our objects of investigation? Absolutely not!" This point of view is but a prelude to a long chapter about UFO contactees and UFO abductees in which the authors maintain, rather than being psychopathological, *most* of these people are "fantasy-prone," i.e. they have difficulty distinguishing between fantasy and reality but otherwise are normal and healthy. Psychologists know that approximately 4 percent of the population do experience exceptionally vivid and involved fantasies. In Bartholomew and Howard's survey of 132 abductees and contactees, all showed one or more fantasy prone characteristics, i.e. psychic occurrences, out-of-body experience, seeing visions or apparitions, hypnotic susceptibility, a supernatural belief system, and a strong "spiritual" orientation.

Here the authors make a valid and useful argument. I, as well as other skeptics, have also concluded that many of the alleged abductees are, indeed, fantasy-prone personality types and are in no way pathological. This does not mean, however, that many other alleged contactees and abductees are totally free from psychopathological symptoms or other serious behavioral disorders or are not perpetrating a hoax, or lying. The line between fantasy and reality is admittedly thin but we must be very careful not to cross it, blur it, or arrive at the point where we can no longer distinguish what is "real" from what is "imagined." If we do, we find ourselves in the land of the madman. It is essential to our mental health and well-being that we make hard, sharp, and clear distinctions between reality and delusions.

As for the authors' argument that labeling contactees and abductees as "fantasy prone" rather than pathological gives the therapist an alternative approach, competent clinicians don't need this alternative. They *automatically* look for the *true* cause and *real* meaning of their client's delusions. Moreover, they manage to maintain their own grip on reality and never buy into the client's delusion or accept as "fact" that their client *really is* Jesus Christ! In a very curious and disturbing final chapter of this otherwise persuasive book, the authors attempt to convince us that belief in alien spaceships, alien contacts, and alien abductions is not a bad thing after all. They cite Whitley Strieber as a good example of a person whose abduction experience led to paranoid symptoms until he admitted the "truth" to himself that the aliens were "real." Once he accepted this, the authors say, his paranoid symptoms disappeared: As for Strieber being a fantasy-prone personality, both Joe Nickell and I have also made this same argument before in the pages of this journal. Strieber's alleged abductions are also classic examples of sleep paralysis with hypnopompic hallucinations. As for Strieber's being better off, his latest book, *Confirmation: The Hard Evidence Of Aliens Among Us* (St. Martins, 1998), argues that not only are the aliens with us but he has implants to prove it—as well as evidence that the government is engaged in a vast conspiracy with the aliens to enslave the human race. This is not pathological and Strieber is to be admired? Well, Strieber did get rich and has, perhaps, inspired others to follow in his steps. If we agree with Bartholomew and Howard's definition of truth as "that which is practical or useful," I still have difficulty in seeing anything either practical or useful in believing in aliens and alien abductions.

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I find it equally difficult to see anything either useful or practical in believing in witches, believing that the Earth is flat, believing that humans spontaneously combust, or believing that demons cause disease. Admittedly, I still cling to the old objectivist view of the scientific enterprise and continue to agree with Philip Klass that alien abductions remain a very dangerous game that sane, thoughtful, and socially responsible people would never want to play. This stance may be passé but I, personally, find it both practical and useful.

Into and Out Of the Therapeutic Abyss

ROBERT A. BAKER

Therapeutic Madness. By John I. Lynch. Verlager Books, 1998. ISBN 0-9660249-0-7. 214 pp. Softcover, $12.95.

A classic joke among critics of the typical mental hospital today is: "The wrong people have the keys." To determine just how true this is, as well as to assess the competence level of the typical psychiatrist and his staff, all one has to do is visit some of these institutions, interview the doctors, and question the patient-inmates. Better still, the investigator-questioner should also interview ex-patients and ask them about their care and treatment. Whenever this is done (unfortunately such follow-ups are rarely, if ever, undertaken), the investigator invariably finds that "cures" of mental (or, rather, *emotional)* disorders and problems are the exception rather than the rule. Moreover, even though the patient is sent home he or she continues to take some sort of mind-medication for weeks, months, or even years.

Whether the "treatment" experience the mentally disordered receives at the hands of the therapist be that of medication, talk, or a combination of the two, makes little difference. Lasting behavior changes, restored emotional stability, and permanent calm and contentment are rarely seen. Though drugged and tranquilized, the client is, in no way, "cured." Unfortunately, people unfamiliar with modern psychiatry and clinical psychology and who have no understanding of what psychotherapists do with the "mentally ill" find it hard to accept the idea that most "mental" medicines, whether pills, talk, or both do not cure. Even more unfortunate is the fact that there is little in the way of published therapeutic standards, fail-safe or fool-proof treatment techniques, reliable and valid diagnostic tools, or *Good Housekeeping* Seals of Approval or *Consumer Reports* checklists to let the average citizen know whether the psychotherapist he employs is competent or a quack.

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Without such needed guidelines and standards, every visit the emotionally disturbed individual makes to a psychiatrist or a psychologist—even those licensed and credentialed—is a crap shoot. Of course, one is usually and generally better off with the licensed and credentialed but such things in no way guarantee either competence, integrity, or the possibility of immediate or lasting help. Little wonder, therefore, that year-by-year the number of angry books written by victims of psychotherapeutic incompetence, malfeasance, and sadism continue to proliferate. John Lynch's *Therapeutic Madness* is one of the better additions to this genre.

Divided into three sections, Part I of Lynch's work describes in poignant detail what he and anyone suffering from a painful anxiety-driven case of obsessive compulsive disorder (OCD) experiences daily: how his successful professional life and ability to function were destroyed, and how he finally sought psychiatric help and acquired a therapist. The most tragic and disturbing part of the section details session-by-session descriptions of Lynch's incompetent (and herself mentally disturbed) therapist as she stumbles and bumbles her way from one therapeutic blunder to another. Then, when these efforts fail she then turns to her pill pouch and prescribes totally unnecessary and inappropriate tranquilizers and other neuroleptics to numb and stifle Lynch's superior intellect.

Much of the interpersonal interactions and conversational by-play between Lynch and his therapist is insane enough to serve as models for TV episodes of *Seinfeld.* Toward the end of the section the therapist's behavior becomes so bizarre the reader forgets that Lynch is *supposed to be the patient!* Most disturbing of all and a warning to those näive enough to believe that psychiatrist-patient confidentiality is sacred, the ease with which Lynch's therapist betrays his confidence is chilling. Most revealing is his therapist's total inability to understand and manage the emotional transference.

Part II is concerned with Lynch's attempt to determine if: 1) his mistreatment was par for the course; 2) if psychiatrists, as a group, are all as disturbed and incompetent as his own lemon; and 3) if the mental health system itself is basically flawed. Lynch accomplishes this with a short but incisive review of the antipsychiatry literature, the literature of psychiatric victimization, attacks on and criticism of the DSM (the Diagnostic and Statistical Manual), and pharmapsychiatry.

After emphasizing that self-help is not only possible but real and effective help, Part III of Lynch's book discusses how he managed to use his own religious beliefs and convictions, along with the staunch support of a loving wife, to help him overcome his anxieties and emotional distress. Lynch was fortunate, indeed, to discover that his personal God was a much better therapist than his psychiatrist Grace.

While many cautious readers might be inclined to assume that Grace, Lynch's confused therapist, is merely one "bad apple" in the large barrel of healthy and able psychotherapists, it is sobering to discover (along with Lynch) that all of Grace's superiors and other psychiatric consultants asked to review Lynch's records and treatment could find no fault with anything Grace did or did not do. Rest assured, in this instance the blind were, indeed, guiding the blind. Or it could be that the psychiatric referees were

correct: Grace's incompetent efforts are, truly, the best that they can do.

Lynch's short but brilliant and disturbing book about formal psychiatry's inability to deal with his obsessive-compulsive disorder is highly reminiscent of John Modrow's superb review of and destruction of the myth of schizophrenia: *How To Become A Schizophrenic: The Case Against Biological Psychiatry* (Appollyon Press, 1992). Both these books are in the tradition of Janet and Paul Gotkin's classic attack on psychiatric malfeasance *Too Much Anger, Too Many Tears: A Personal Triumph Over Psychiatry* (Quadrangle, 1975). Certainly, as the negative evidence against psychiatric mistreatment continues to accumulate, we deserve and soon should witness something in the way of organized professional efforts to clean the psychotherapeutic house. Continued toleration of and apologies for the ignorance and arrogance of what Thomas Szasz and others have called "The Therapeutic State" must be brought to a halt.

The skeptical reader and all others inclined to believe that both Lynch and this reviewer exaggerate and that we are, hysterically, impugning psychiatry and psychotherapy are urged to read Sydney Walker's *A Dose Of Sanity: Mind, Medicine and Misdiagnosis* (John Wiley & Sons, 1996), James L. Kelly's *Psychiatric Malpractice* (Rutgers University Press, 1996), and the reviewer's own work *Mind Games: Are We Obsessed With Therapy?* (Prometheus Books, 1996). All of these support and strengthen Lynch's arguments and his position that psychotherapeutic incompetence is far from rare and many therapists are, indeed, quite mad! If you ever find yourself in need of one, take care. Be sure that the one you choose is at least as sane and stable as you are! □

NEW BOOKS

Beyond the American Dream: Lifelong Learning and the Search for Meaning in a Postmodern World. **Charles D. Hayes.** Autodidactic Press, P. O. Box 872749, Wasilla, AK 99687. 1998. ISBN 0-9621979-2-0. 365 pp. Hardcover, $26.95. A call for citizenship organized around the idea that seeking knowledge critically and passionately, for its own sake, gives purpose and meaning to living. One of the subthemes is the confusion of knowledge and perception. Says the author: "Reason is a far greater authority than gurus and a positive future depends on it."

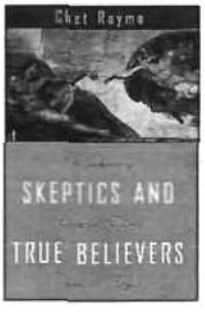
The Creation/Evolution Controversy: An Annotated Bibliography. **James L. Hayward.** Scarecrow Press, Inc., 4720 Boston Way, Lanham, MA 20706. 1998. ISBN 0-8108-3386-7. 252 pp. Hardcover. A valuable collection of 447 annotated references (one long paragraph per entry) intended to give students, teachers, lawyers, writers, historians, scientists, clerics, and other interested persons an overview of the literature (almost all of them books) dealing with the creation/evolution controversy. Except for a section of historical references, most of the books have been published since 1981. Organized into sections on history of the controversy; philosophical, theological, and general references; physics and cosmology; earth science; and biology and anthropology. In each section the references are further divided into theist and nontheist materials. Author, title, and subject indexes.

Critical Thinking Step by Step. **Robert Cogan, Ph.D.** University Press of America, 4720 Boston Way, Lanham, MD 20206. 1998. ISBN 0-7618-1067-6. 383 pp. Paper, $39.50. A comprehensive, elementary text intended for the typical university or college student from argument analysis and simple logic through epistemology to critique of religion, pseudoscience, and global corporate capitalism. Illustrated with over 60 line drawings.

Spirits can do anything . . . except explain, predict, and control!
From *Critical Thinking Step by Step*

Riddles of the Sphinx. **Paul Jordan.** Sutton Publishing Limited, Phoenix Mill, Thrupp, Stroud, Gloucestershire, GL5 2BU. 1998. ISBN 0-7509-1553-6. 222 pp. £25. Hardcover. Beautifully produced and illustrated book (with abundant color photos by John Ross) tells the full story of the Great Sphinx of Giza as Egyptology has discovered it. According to the publisher, "Some recent writers have promoted fantastic ideas about the Sphinx's immense antiquity and its creation by a lost super-civilization to send messages of doom to our own times. *Riddles of the Sphinx* is intended as an antidote to such high-flown theories, exposing the flaws in the would-be scientific arguments of these fanciful writings and providing a lively account of what Egyptologists have found out about the Sphinx for real."

Skeptics and True Believers: The Exhilarating Connection Between Science and Religion. **Chet Raymo.** Walker Publishing Company, Inc., 435 Hudson St., New York, NY 10014. 1998. ISBN 0-8027-1338-6. 288 pp. Hardcover, $23. The noted astronomy teacher, columnist, and author conducts a fascinating, subtle discussion of the issues along the interface between science and religion. As he says in the Introduction, "I am one of those people, trained in science, who cannot quite accept the idea of God nor quite leave it alone." Throughout the book he resolutely defends science while recognizing its limitations. Says Raymo, "We are a culture divided at its heart." He calls himself a "thoroughgoing Skeptic" who, like many others in today's society, "hunger for a faith that is open to the new cosmology—skeptical, empirical, ecumenical, and ecological—without sacrificing historical vernaculars of spirituality and liturgical expression."



Editor's Choice: ***Imagined Worlds.*** **Freeman Dyson.** Harvard University Press, Cambridge, MA 1997. ISBN 0-674-53908-7. 216 pp. Hardcover, $22.

—Kendrick Frazier

"Creationism Continued." *American Scientist* (Letters to the Editor), May–June 1998. A series of letters in response to the earlier article by Donald Wise, "Creationism's Geological Time Scale" (March/April), see our Articles of Note column of May/June.

Crews, Frederick. "The Mindsnatchers." *The New York Review of Books,* June 25, 1998, pp. 14-19. Major critical essay about UFO abduction/visitation beliefs and believers, stimulated by new books by abduction believers David M. Jacobs and Whitley Strieber and political scientist Jodi Dean. Notes Crews: "There is nothing unusual about the way most abduction memories are formed. They begin with sleep paralysis, the same condition of half-awake dreaming that once fed into widespread and catastrophic delusions of possession by witches, incubi, or Satan himself. Alarmist books and programs about alien invasion take the place of religious folklore in shaping the preliminary interpretation that scientifically uninformed Americans overlay on such experiences. But typically, it is only in the office of a true-believer hypnotist or the quasi-Mesmeric practitioner that the hunch congeals into 'truth' and becomes a lasting threat to the dreamer's equanimity." Crews says Dean's book, far from confronting such irrationalities, "strikes an attitude that is more disturbing in its way than anything said by Professors [John] Mack and Jacobs." Adding her own postmodernist, ideological twists, she approvingly interprets abduction reports as political acts contesting the status quo against "political, governmental, and corporate authorities."

Gangarosa, E. J., A. M. Galazka, C. R. Wolfe, L. M. Phillips, R. E. Gangarosa, E. Miller, R. T. Chen. "Impact of Anti-Vaccine Movements on Pertussis Control: The Untold Story." *The Lancet,* January 31, 1998, 351: 356-61. An international assessment of the impact of anti-vaccine movements that targeted pertussis whole-cell vaccines. Pertussis incidence was ten to 100 times lower in countries where high vaccine coverage was maintained than in countries where immunization programs were compromised by anti-vaccine movements. The study shows that these vaccines continue to have an important role in global immunization.

Garber, Joseph R., "Ghostbusters." *Forbes,* May 18, 1998, p. 308. Column about prevalence of pseudoscientific beliefs and how they might be embraced by your company's employees. "Those who hold pseudoscientific beliefs aren't the lunatic fringe any more. They are approaching the majority. Therein lies a management problem: Statistically speaking, the odds are that some of your employees are flakes." Harmless silliness? No, he says. Using numerology to screen job applicants or using astrology to check creditworthiness will probably land you in court. Garber urges managers who need help in separating the wheat from the chaff to consult with voices of reason, including "the granddaddy of them all," CSICOP (www.csicop.com), and also QuackWatch (www.quackwatch.com) and a junk science Web site, www.junkscience.com.

Gazzaniga, Michael S., "The Split Brain Revisited." *Scientific American,* July 1998, pp. 51-55. Thirty years after the author, a Dartmouth cognitive neuroscientist, helped bring the split-brain concept before the public, he revisits the topic to show how split-brain research has continued to illuminate many areas of neuroscience. One fascinating new finding shows that false memories originate in the left hemisphere. MRI imaging shows that when a false memory is recalled a region in both the right and left hemispheres is active; during a true memory, only the right is active. The two hemispheres also deal with illusions differently. The right hemisphere tends to take a very literal approach to perception, but the left hemisphere seeks to find meaning and order. "The interpretative mechanism of the left hemisphere is always hard at

SCIENCE BEST SELLERS

Top Ten Best Sellers in **Washington, D.C.**

1. ***The Sacred Balance***
   David Suzuki and Amanda McConnell; Prometheus
2. ***Consilience***
   Edward Wilson; Knopf
3. ***Life's Other Secret***
   Ian Stewart; John Wiley
4. ***Questioning the Millennium***
   Stephen Jay Gould; Random House
5. ***Remaking the World***
   Henry Petroski; Knopf
6. ***Life: An Unauthorized Biography***
   Richard Fortey; Knopf
7. ***How the Mind Works***
   Steven Pinker; W W Norton
8. ***The Number Sense***
   Stanislas Dehaene; Oxford University Press
9. ***The Symbolic Species***
   Terrence Deacon; W W Norton
10. ***Impossibility***
    John Barrow; Oxford University Press

By arrangement with *New Scientist* magazine, July 1998. See Planet Science at **http://newscientist.com** for more reviews. Some books also available at the Planet Science Shop.

work, seeking the meaning of events, says Gazzaniga. "It is constantly looking for order and reason, even when there is none—which leads it continually to make mistakes. It tends to overgeneralize, frequently constructing a potential past as opposed to a true one."

Gould, Stephen Jay, "Let's Leave Darwin Out of It." *The New York Times,* May 29, 1998, p A19. Gould calls on idealogues on both the right and left to leave Darwin and evolutionary theory out of their agendas for social or political change. "The fact of evolution in general (and the theory of natural selection in particular) cannot legitimately buttress any particular moral or social philosophy." He adds, "Darwinian evolution continues to grow in vibrancy and cogency as the centerpiece of the biological sciences." He says using Darwin to advance personal agendas is a misuse and abuse of science.

Hines, Terence M. "Comprehensive Review of Biorhythm Theory." *Psychological Reports,* 83:19-64, August 1998. A detailed review of 134 studies of biorhythm theory, both published and unpublished. Thirty-five of those reported some support for biorhythm theory. The author's careful examination of these studies identified methodological and statistical errors that account for the claimed findings supporting the theory. Another ninety-nine studies, covering many different variables, yielded no support. The conclusion is that biorhythm theory is not valid.

Stewart, Ian. "What a Coincidence!" *Scientific American,* June 1998, pp. 95-96. Like some of the articles in this issue of *SI,* Stewart, in this Mathematical Recreations column, examines the most common types of coincidences, especially the shared-birthday coincidence.

Tessman, Irwin, and Jack Tessman. "Troubling Matters." *Science* (Letters), 278: 561, October 24, 1997. Letter about an earlier profile of Herbert Benson of Harvard's Mind-Body Medical Institute views Benson "as a publicizer of therapeutic claims that appear not to be supported by the data."

—Kendrick Frazier

NUMEROLOGY

from page 31

by chance. Someone put them there! Who could it be? And for what reason? There *has* to be a reason! This line of thought should be resisted since the 57s are no more amazing than my possession of dollar bill number F 84323030 C. They may seem more amazing, because the number of 57s that Finnessey has managed to quarry out of the history books is larger than the number of letters and digits in the serial number, but the same principle applies in both instances. Just as the serial number was printed on the bill before I got it, and is thus in no way amazing, the 57s all existed before Finnessey started to look for them.

The second kind of amazement is more appropriate: amazement at the diligence and cleverness of Finnessey in finding them all. In some places the cleverness is strained, and it shows—*Yorktown* does not gematrize to a multiple of 57, nor does *Lexington-Yorktown,* but throwing in, as Finnessey did, *Saratoga* and *Continental Congress* makes it come out. Also, there is nothing peculiar to the American Revolution that makes six years the same as 57 months, 57 weeks, and 57 days. Nevertheless, Finnessey did amazing work. You or I would never have noticed that 96, as in Ninety-Six, South Carolina, is the sum of the number of signers of the Declaration of Independence and the Constitution.

What you should *not* feel is that there must be something behind all the 57s. All that is behind the 57s is Finnessey, finding 57s. Given as rich a subject field as the American Revolution, they are not hard to find. To show you how easily 57s can be had, I have found one in a much less rich field, the serial number of my dollar bill. Since F is the sixth letter of the alphabet and C is the third, we can reduce the serial number to an integer, 6843230303. Written as a product of primes,

$$6843230303 = 7 \cdot 13 \cdot 13 \cdot 17 \cdot 227 \cdot 1{,}499$$

If you sum the digits of the factors, you will find that the total is 57. What else could it be, on a bill with George Washington's picture on it? Speaking of George Washington, note that the sum of the last two primes in the factorization is 227 + 1,499 = 1,726 and when we add 6, the number of primes in the factorization, we get 1732, Washington's year of birth. Further, 1,726 is significant since $1 + 7(2 + 6) = 57$.

You may have the unworthy suspicion that I made up that serial number on purpose, just so I could get those things out of it, but I did not. The bill came directly from my wallet. The first 57 that I extracted from it did not come immediately. Finding it took effort, effort that does not show in the statement of the result. Readers of the amazing results that number-searchers find may not take this into account. I had to look at quite a few of the infinite number of ways of combining the digits in the serial number to get a 57, or a multiple of 57, which would have been almost as good. My glow of pleasure at producing the 57 that I did—I'm quite proud of it, actually—may explain, partially, why Finnessey and others like him devote the enormous amount of time that they do in trying to discover 57s, multiples of 11, or whatever it is that they seek in their pyramid, their Bible, or their revolution. It feels so good when you succeed. But only the successes are reported, not the huge number of failures.

It is to Finnessey's credit that he did not conclude that the 57s in the Revolution were put there by UFO space aliens or anything similar. He presented them, and let readers draw their own conclusions. He may have had space aliens on his mind, but he did not write about them.

Similarly, the 57 in my dollar bill was not put there by anyone, any more than anyone put all those 57s in the American Revolution. It did not get there, and they did not get there, from some higher intelligence, or from anyone's knowledge of ancient and lost wisdom. No conspiracy operated, darkly pulling 57 strings. Chance was at work. Just chance. Chance, that's all.

Reference

1. Finnessey, Arthur. *History Computed.* Atlanta, 1983. □

Harold Puthoff Responds on Zero-Point Energy

HAROLD PUTHOFF

In his column "Zero-Point Energy and Harold Puthoff" (May/June 1998) Martin Gardner got much of it almost right, but not quite. Although some of the questions he asks were no doubt rhetorical, I thought it might be useful nonetheless to provide some answers and fill in some blanks.

Though ostensibly about my physics work concerning zero-point energy, the first several columns of the article are devoted to what Martin Gardner would have the readers believe is my "sordid" past, involving as it does a youthful involvement with Scientology, and my decade and a half as Director of the CIA/DIA-sponsored program at SRI International on remote viewing and other things paranormal. As to a summary of the latter, I refer the interested reader to an article I wrote when some of the early work became declassified (Puthoff 1996).

My defense with regard to my involvement in such arcane subjects may come as somewhat of a surprise to those whom I presume to be devoted readers of the SKEPTICAL INQUIRER. It is this. I consider myself, as a radical empiricist, to be an unreconstructed arch skeptic! A corollary of this, of course, is that my skepticism is a double-edged sword that cuts both ways. I am on the one hand skeptical of bizarre claims, but I am equally skeptical of their facile dismissal on the basis of unexamined establishment belief. (As one might correctly infer from these remarks, in my view many "skeptics" are not skeptical enough.) Since I choose not to accept the given wisdom without question, nor rely on anyone else's authority, I opt to investigate such things for myself. Unfortunately, in our "sound-bite" culture many mistake *willingness to investigate* as an indication of *compulsion to believe.*

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As an example, let's take the subject of my brief involvement in Scientology in the early 1970s to which Gardner devotes considerable space. He notes, correctly enough, that I am on record as being no longer involved, but asks "but how much of it does he still buy?" What I "still buy" is that GSR (galvanic skin response) can be used to dredge up forgotten traumatic memories from youth, with some cathartic effect. I learned this first by accident during routine polygraphing for security purposes when I was an NSA employee in the early 1960s. It was this experience that led me out of curiosity to later investigate Scientology procedures from an empirical, firsthand viewpoint. I believed, however, that, in addition to the expected defects that accompany any circumscribed belief structure, the ethics of the organization in those years was developing some fatal flaws as well, so I severed all connection. It is ironic to me that during the time I was being accused of being a Scientology member by Martin Gardner and others, the Scientologists were picketing me for my outspoken support of those who would dare call them to task for their activities! So it goes.

Now to the meat of the article, zero-point energy (ZPE), its attributes, and the role Martin Gardner assigns to me with regard to pursuit of its significance. As is always the case with Martin Gardner's expositions on technical matters, his grasp of the fundamentals is undeniable, and his elucidation eloquent.

On the subject of whether the ZPE can be extracted for use beyond chemical levels, or manipulated to affect gravity/inertia at a detectable level, however, he misses the mark in attributing these concepts solely to me as a "lonely pioneer" fighting an uphill battle against "the opposition of mainstream physicists." In so doing he does an injustice to the seminal efforts of physicists A. Sakharov, P. Davies, and R. Forward who laid the groundwork for serious consideration of these issues, and he fails to recognize that current ZPE research is a collaborative effort involving not only colleagues from my own Institute (the Institute for Advanced Studies at Austin), but also from industry (Lockheed-Martin, IBM), academia (California State University at Long Beach), and government (Los Alamos

National Laboratory, NASA, Phillips Laboratory at Edwards AFB, CA), to name those most directly involved. Furthermore, the results of these collaborations, rather than being shunned by the mainstream, are being published in *Physical Review, Science,* and other peer-reviewed, mainstream journals.

Gardner also failed to mention that, based on work by myself and colleagues concerning a ZPE basis for inertia (Haisch *et al.* 1994), a detailed Air Force study has outlined a comprehensive program to study the implications of ZPE research for possible inertial mass modification (Forward 1996). Nor did he mention that at the conclusion of last summer's meeting of approximately eighty scientists brought together to discuss propulsion physics at NASA's Lewis Research Center, eight breakout groups independently rated ZPE research as a priority item for further investigation.

With regard to Gardner's concern that our Institute's investigation of claimed ZPE energy devices might be diverting funds from more promising avenues of research, he need only check our website www.eden.com/~little to satisfy himself that the Institute has through its investigations saved investor groups literally millions of dollars that might otherwise have been invested in unworkable devices promoted by enthusiastic but misguided inventors.

Finally, of course, healthy skepticism about the promise of ZPE conversion, as about the promise of, say, hot fusion, is fully justified. This is especially the case in an area such as ZPE research that is at the frontiers of both our physics understanding and engineering capability. However, given global energy concerns, disregard of any possible energy solution is a luxury that we can ill afford, and that would be irresponsible for the scientific community to embrace. Fortunately, the self-corrective merits of good science can be counted on to separate the wheat from the chaff, and to optimize the outcomes for potential application. In my opinion, it is this reliance on the scientific method, not polemics, that should guide our efforts.

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Responding To Puthoff: Zero-Point Energy

MARTIN GARDNER

I'm delighted to learn that Harold Puthoff has severed his ties with the Church of Scientology, though to what extent he may still accept some of its basic doctrines remains unclear. In any case, to have once taken L. Ron Hubbard seriously is no tribute to Puthoff's youthful sagacity.

The most striking aspect of Puthoff's letter is what it does *not* say. There are no hints concerning his present opinions about ESP, PK, and precognition. Nor does he repudiate his conviction that two theosophists, more than a century ago, remote viewed the interior of atoms with results unexplainable by chance.

Regarding ZPE (Zero-Point Energy) Puthoff lists three physicists as "laying the groundwork" for his efforts to obtain unlimited energy from the vacuum of space. Andrei Sakharov is cited only because he once speculated that gravity might be the result of ZPE when altered by matter—a wild conjecture that has led nowhere. I can't imagine why Paul Davies is mentioned. Did Puthoff forget that I quoted Davies as saying it was folly to search for a ZPE machine?

Robert Lull Forward is the only physicist among the three who reasonably can be said to have furnished "groundwork" for Puthoff's research. Forward is a maverick physicist, best known for his "hard" science-fiction novels such as *Dragon's Egg, The Flight of the Dragon Fly, Martian Rainbow,* and *Timemaster.* His nonfiction *Future Magic,* a 1988 Avon paperback, does indeed contain suggestions about how ZPE machines might be constructed. Forward also describes devices for producing repulsive gravity, for traveling backward in time, and other fantasies. Avon summarizes the book as identifying the boundaries of the human soul, flying to stars on beams of light, climbing a magic beanstalk into space, soaring through the solar system on magic matter, and defying gravity.

Forward ends his book by predicting that quantum mechanics will some day provide a "natural" explanation of ESP that will remove it "from the pages of the tabloids" and place it on "the pages of scientific journals." He defends the view that our brain's pattern of molecules constitutes an immortal soul. "It may be," he concludes his book, "that on some

future-magic day, rather than denying the existence of the spirit, science will prove that the spirit *does* have a physical reality and that there *is* life after death."

It goes without saying that research on the nature of ZPE should continue, but that was not the point of my column. The point was: Is Puthoff, with his record of psychic research, and his beliefs about the paranormal, a good man to trust with large funds for efforts to build what most physicists think is apparatus as incapable of providing free energy as a perpetual motion machine?

Let me repeat the question I asked in my column: "Puthoff: do you still believe that [Uri] Geller is a genuine psychic with remarkable paranormal powers?"

I'm still waiting for an answer.

(See also Letters to the Editor, this issue—Editor) □

NOT *BELIEVING WEIRD THINGS*

from page 45

the universe affecting us, our observations give reality to the universe.

Why Should People Prefer Science?

From the layman's point of view, why does science offer a more plausible explanation of the world than religion or pseudoscience? The nonspecialist certainly cannot judge the validity of much of modern physics. Even most physicists are hard pressed to do so unless they happen to be specialists in these esoteric fields. Publications attempting to explain these theories to the public often rely on such fantastic concepts as backward time travel, the false vacuum, or the Higgs field, in effect merely substituting one mystery for another. To nonspecialists such accounts are little different from religion: to believe or not to believe is an act of faith.

I am not suggesting that the theories of physics are necessarily wrong or even problematic simply because they are fantastic. Nor am I advocating belief in such things as UFOs, ESP, and astrology. There are excellent reasons, supported by enormous amounts of evidence (much of it presented in this very magazine), why we should be highly skeptical of these ideas. Nevertheless to the general public—even the well-educated part of that public—many of the notions of modern science are just as fantastic as those of pseudoscience or religion.

So what *can* we do to produce a public that is scientifically literate enough to distinguish between the speculative forefront of genuine science and the far-fetched claims of pseudoscience? Most important, we have to insist on high-quality science education at all levels. Children need to experience the wonder and excitement of the natural world as well as learn how science is done. This will never be accomplished using ill-prepared teachers who fear the subject or by trying to make up for twelve years of science illiteracy by requiring one or two watered down general education science courses for college graduation. Science and its methods should be an ongoing part of all education beginning in the first grade.

Science education need not be limited to schools but should be extended through stimulating museum exhibits and television documentaries that stress the *methods* of science. Scientists must welcome the opportunity to explain new ideas to an interested public using clear physical explanations that are intelligible and plausible to a general audience. Such accounts should clarify the origin of novel ideas, show where they are supported by evidence, and indicate how they might be tested.

As a science teacher, I have dedicated much of my life to education in the belief that through continual learning, people will come to realize that the methods of science provide a far more reasonable explanation of the world than the unsupported claims of pseudoscience or religion. Yet as we have seen, science at times makes claims that seem just as preposterous as those of religion and pseudoscience. And religion does have the advantage of speaking to our most deeply felt needs. It tells us that our lives are significant and provides an illusion of control and a "glue" for society. For many people, abandoning such beliefs would take away a personal meaning to life that science simply cannot replace. Therefore it will probably be quite some time before Darwin replaces Genesis. Also, since keeping up on scientific developments can be highly daunting, for nonspecialists it is often simply a matter of *faith* to accept a scientific explanation of the world rather than a religious or a New Age viewpoint.

The current status of science may be comparable to that of Christianity in the early Middle Ages in Europe. Most people could not read, so they accepted the teaching of the Church because it was backed by intellectual authority and seemed to be an accurate account of the world. Stories from the Bible were publicly portrayed on the great Gothic cathedrals and in medieval miracle plays, such as *Play of Daniel,* much as teachers and writers today try to explain the latest scientific theories to the general public. As science continues to go far beyond the understanding of nonspecialists, maybe we will follow the model of the Middle Ages. For nonspecialists, acceptance of science may be an act of faith without understanding. As it is, many people currently prefer pseudoscience or religion and we will be hard-pressed to convince them otherwise.

Unless science continues to produce tangible benefits to society, the public may well decide that it is not worth supporting. The death of science could come not from the exhaustion of its subject matter, but from its irrelevance to a humanity that has "switched channels."

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Irresponsibility and Psychological Harm in Exploiting the Abduction Theme

I picked up your magazine for the first time when I recognized Susan Blackmore's name on the May/June cover ("Abduction by Aliens or Sleep Paralysis?"). I'd recently read *Dying to Live,* Blackmore's book about near-death experiences, and found it to be heavy on useful information and light on cynical, disparaging remarks—a nice surprise. I admire and appreciate Blackmore's willingness to take a careful closer look at odd things and come up with theories that can actually be tested.

In the mid-1970s I survived a brutal physical assault, after which I was left unconscious in a public park at night. For many years, all I remembered of this assault were the big-eyed, little grey men I saw surrounding me *afterwards,* in the twilight moments before I could move, before I regained full consciousness. My memories of the trauma itself were painfully fragmented and full of what seemed like strange, impossible details—brilliant flashing lights, chunks of missing time, the aliens, vivid images of the night sky, and other anomalies. Many years later, I began to experience debilitating panic attacks and bouts of depression, recurring nightmares involving the "greys," and odd, overwhelming experiences with bright light. No medical problem was found, so I went into therapy and was diagnosed with "post-traumatic stress." I cannot overstate how upsetting this all was for me and my family. *I have never felt so confused, so disoriented,* so unsure about what comprised "reality." I wish my experience on no one.

At no time did any medical professional suggest that I might be experiencing brain seizures (which, after much research, I now strongly suspect is what was happening). In fact, at one point, my therapist mentioned John Mack, and suggested that I might have been abducted by aliens in *addition* to having been assaulted! She explained that, (in her brand of therapeutic lingo), memories of alien abduction cannot be "screen memories" for trauma, because screen memories are always *less* threatening in content, and exist to protect the victim from the profound negative emotions associated with the original trauma. It is generally assumed that being abducted by aliens is so much more traumatic and provokes so much more social ostracism than ordinary violent trauma, that no one's psyche would cough it up as a defense mechanism. Having survived an human assault, and having thought for many years that this trauma was an alien abduction experience, I believe I am in a unique position to compare these two scenarios, and I can say for sure that everyone in my life, including myself, would much rather believe the alien thing.

People like Budd Hopkins, John Mack, and David Jacobs are, in my opinion, behaving irresponsibly in their dealings with abductees. We do not know enough about how the brain responds to trauma and/or extreme stress to be exploiting people in that kind of pain, nor do we properly understand the personal and/or cultural function of "normal hallucinations" such as experiences with bright light or waking dreams. People who write popular books about alien abductions generally make a big deal about how ordinary and "sane" abductees tend to be, as if categories of sanity are themselves perfectly understood and static. They are not. The DSM II is not even as old as I am, and it is regularly changed. People who live with chronic mental illness often function at very high levels with proper treatment; some are even famous. (In fact, many are writers!)

Conversely, people without clinical signs of mental pathology can feel disturbingly ill after personal cataclysm. It is disrespectful and misleading to talk about individual human beings as though we can be easily be labeled either "crazy" or "sane." "Sane" people can have crazy problems. "Crazy" people can make lasting contributions to society. Psychology is still an infant science. We are much too casual with its rhetoric.

My biggest concern, however, is that the literal, popular approach to abductions is just not *helpful.* Certainly it is not helpful to abductees, who are left stewing on their frightening visions indefinitely, or else are forced into spiritualizing them just to get some relief from the emotional chaos. It is not helpful to the human community at large, for it adds nothing to our collective understanding of the structure and function of imagination: that lost continent of human experience so often degraded and dismissed by empirical thinkers. "Just imagination" you say? There is nothing "just" about imagination! When a powerful narrative attaches itself to intense bodily experience and vivid imagery, stand back. Think of the sixteenth century witchcraft trials. Think of Heaven's Gate. Imagination deserves our respect and our critical attention, our very best thinking, especially now that visual media are so dominant and powerful.

In particular, I would like to see the possible links between physical trauma and the narrative and imaginal functions of human cognition explored more carefully and respectively. I believe I deserved more compassionate and informed treatment in this regard, and so do other people who are struggling with strange experiences. I feel I spent a lot of money and time getting very little help with this. In the end, I was thrown back on my own resources, my own critical capacities. I worry, what about people who don't have critical capacities? They shouldn't be used to get someone else's book published.

Pamela Roberson
Mishawaka, Ind.

Transforming Experiences and TLE

I read with interest the articles in the May/June 1998 issue that present alien abductions as sleep-related phenomena. I think readers will enjoy my latest book, *Strange Brains and Genius: The Secret Lives of Eccentric Scientists and Madmen,* which discusses various mechanisms whereby temporal lobe epilepsy (TLE) may play a role in both the alien abduction phenomenon and religious experience. For example, a significant number of abductees exhibit TLE symptoms: feeling heat on one side of their faces and overwhelming apprehension, hearing a ringing in their ears, seeing flashes of light, reporting a cessation of sound—and experiencing *jamais vu,* formication, vivid smells, hallucinations, rapid heartbeats, the sensation of raising and falling, and partial amnesia. By applying magnetic fields to the brain, possibly affecting the temporal lobes, researchers can induce people to feel as if alien hands were grabbing their shoulders.

In my book, I also report on a range of deep religious experiences that are triggered by TLE. As just one example, various nuns have "apprehended" God in TLE seizures, and, in ancient days, a TLE experience would be thought to be God. Researchers have suggested that Mohammad, St. Paul, and other religious figures exhibited TLE symptoms. This is not meant to demean the religious experience, because all of our emotions, artworks, ideas, and perceptions stem from electrical activity in the brain—and a TLE experience in special individuals (like van Gogh, Dostoevsky, and religious prophets) can spark a profound search for beauty and the nature of reality. However,

as the renowned author Eve LaPlante has suggested, abnormal brain activity "challenges our assumption that we can control who we are and calls into question our conventional notions of credit and blame."

Clifford A. Pickover
Yorktown Heights, New York

Experimenter Effects in Science

In "Could Experimenter Effects Occur in the the Physical and Biological Sciences?" (May/June 1998, p. 57), Rupert Sheldrake says, "blind procedures are rare in most branches of the physical and biological sciences." I cannot speak for others, but in experimental particle physics, the use of blind procedures to reduce experimenter effects is routine.

In physics, the pitfall to avoid is selection bias whereby the data is culled to yield what the experimenter "knows" to be the correct answer. *This is a well-known effect*, and is one reason why results are not trusted unless their statistical strength is greater than "three sigma" ($P < 0.13\%$). This is a heuristic method for accommodating such systematic biases.

The kind of double-blind procedure used in clinical trials is usually not possible or helpful in particle physics, but similar methods are useful. One typically studies the behavior of the apparatus before looking at the data of interest. The experimenter chooses an analysis method that maximizes *the desired measurement sensitivity. Only* then does she look at the data to obtain a result. I regard this "self-blinding" to be equivalent to Sheldrake's blind methodology.

I wonder how much of Sheldrake's effect results from differences in terminology. When I took an informal survey of colleagues in my research group, none understood what I was talking about until I explained the issues.

John J. Thaler
Department of Physics
University at Urbana-Champaign
Urbana, Ill.

Rupert Sheldrake points out the potential problems with experimenters' expectations "influencing the data" when "blind methodology" is not employed.

I would like to suggest there is another experimental bias problem, that of selective scrutiny. When an experiment or observation turns out counter to our expectations and desires, we are apt to check carefully for sources of potential confounding, entry error, computational error, even "biased observation." But results consistent with what we expect and want do not trigger further scrutiny. We don't ask "what could have gone wrong" when there appears to be nothing "wrong."

Moreover, just as our ideas and hypotheses are occasionally correct, we are occasionally correct in believing that apparently undesirable results are due to error. (At least, I have been.) Thus, double checking can be very rewarding, and such "partial reinforcement" is particularly "resistance to extinction." Scrutinizing "beautiful" results, however, and finding an error would never be rewarding at all.

Like Sheldrake, I can't estimate how often selective scrutiny occurs. I suspect it's a lot, and that many of the controversies that arise from failure to replicate stem not from biased observation, but from the biased double-check.

Robyn M. Dawes
The Charles J. Queenan, Jr. University Professor
Department of Social and Decision Sciences
Carnegie Mellon University
Pittsburgh, Pa.

I appreciate Rupert Sheldrake's survey on *the use of double-blind experimental methods*. The question of whether some sciences are immune to experimenter effects has, I think, already been answered. Astronomers in the nineteenth century spent considerable time trying to develop "personal equations" to compensate for observer variability. This dream went unfulfilled. The "N-rays" story is well known to many skeptics, and provides another example of how physical scientists can fool themselves. I doubt any branch of science is somehow "immune" to experimenter effects.

Nevertheless, there are factors that will meliorate problems caused by experimenter effects. If the research field is reasonably large and active, other labs will often independently replicate results. The need for double-blind protocols increases in fields where the research base is very small (e.g., parapsychology), the hypothesis being tested is highly contentious (e.g., parapsychology again), or where replication is very costly (e.g., medical research, where "cost" can be measured in human lives).

Zen Faulkes
Department of Biology
McGill University
Montreal, Quebec

I found the article "Could Experimenter Effects Occur in the Physical and Biological Sciences?" to be a weak piece of work. Since "physical scientists" usually study things that are dead, with things that are dead (computers and measuring equipment), the idea of a blind or a double-blind experiment has no meaning. Also, any errors by the experimenter will be found out when the experiment is repeated by other scientists at other laboratories.

The examples of "cold fusion" and high-temperature superconducting material show that "physical scientists" can accurately weed out the good from the bad. Within one year of the announcement of high-temperature superconducting material, several laboratories had reproduced and improved upon the original results. For cold fusion the opposite happened. Several laboratories reported positive results; while others reported negative results. An analysis of the technique used by those who found positive results showed possible sources of error. The consensus now is that "cold fusion" doesn't exist.

Secondly, Sheldrake's statement that running a blind experiment will have an effect on procedures, observations, and data selection doesn't make a lot of sense. You have to tell the "blind" person what to do, what to look for and what data to collect. You don't test a drug to lower blood pressure by seeing how fast a person can run a mile. Also the person in charge selects the data to be used and the procedure to be followed. This is not affected in a blind experiment. Only in the observation portion is there a real source of unconscious bias. That is why the "blind" person is used.

Sheldrake should feel free to find one example of an experiment in the physical sciences, performed on something dead and with the data taken by equipment, whose results would be improved by having been performed "blind." Until then, his suggestion should be taken as a solution for which there is no problem.

Keith Dow
Folsom, Calif.

Zero-Point Energy and Puthoff

In "Zero-Point Energy and Harold Puthoff" (May/June 1998), Martin Gardner challenges Puthoff's current work by reminding us of Puthoff's earlier involvement with psi research. Given that Gardner has in the past criticized scientists like Puthoff for working on paranormal topics outside their training and expertise, he surprisingly now apparently criticizes Puthoff for returning to physics. Gardner also ignores that much of Puthoff's recent zero-point energy work (whatever the ultimate judgment of its merits) has been published in peer-reviewed and quite mainline physics journals. So there are obviously fellow physicists who deem his work valuable. One would have expected Gardner to welcome Puthoff back into conventional science instead of dredging up his earlier work in what seems a kind of "guilt by association."

Gardner also quotes unnamed "many physicists" who complain that Puthoff's funding (which seems to be from private rather than government sources, anyway) may be "diverting funds from more promising investigations." Surely, this is a complaint of nearly everyone not funded about those who are, even where the research is conventional. It is also likely that Puthoff's funding comes from sources specifically attracted by the high-risk-but-potentially-big-payoff nature of his work, so it might not even be available for the more orthodox work these critics favor.

Marcello Truzzi
Center for Scientific
Anomalies Research
Grass Lake, Mich.

I have long enjoyed and respected the eminent skeptical writer Martin Gardner for his erudition, clarity, and decency. I am saddened to find that his usually fully justified skepticism has caused him to portray Hal Puthoff in an unfairly biased fashion. This in turn reflects on the credibility of SKEPTICAL INQUIRER and CSICOP. I have perused every issue of *SI*, and as a psychic and mystic, value and appreciate their commitment to fair and rigorous, albeit lively, skepticism.

A list of Puthoff's papers show that the papers that Gardner describes as "recent conjectures far out on the fringe of physics" have been published in *Physics Review* in 1987, 1989, 1993, and 1994. These papers received very supportive welcome in *The Sciences* (Nov/Dec 1994). If this peer-reviewed work has attracted any expert critical rejection, I would like to have the references. It is, of course, still true, as Gardner hastened to cite, that Puthoff has often speculated much more freely in some very fringy publications.

As an amateur, I have been involved for two years in critical discussions of cold fusion and new energy research, first with näive enthusiasm and for sixteen months as a pragmatic skeptic, and so I can testify that Puthoff and his very competent experimentalist, Scott Little, of EarthTech International, have systematically, painstakingly, and publicly proved null results with a number of systems: including the Potapov generator, the Ragland electrolytic cell, and the CETI Patterson cell.

Rich Murray
Santa Fe, N.M.

Martin Gardner's column on "Zero-Point Energy and Harold Puthoff" served to remind me how fuzzy the division can be between mainstream science and fringe activities. It is no wonder that the two are indistinguishable to many people.

While I have read various references to zero-point energy and the Heisenburg uncertainty principle, nothing in my science education (including obtaining an M.S., along with fifteen credits of college physics) has allowed me to intelligently evaluate the various remarkable claims made on the subject.

Mr. Gardner has done us the favor of putting many of these claims in a small space. . . .

I have a few questions. If this borrowed energy has somehow been made manifest, is there a repository of negative energy (whatever that is) some place that maintains the balance? If the pressure from Z-PE is "sufficient to prevent gravity from collapsing white dwarf stars," how is it not able to resist the collapse into a neutron star or black hole under other circumstances? In either case, doesn't this require a lot more energy than would be found in a can of gasoline?

If a mystic made a similar set of apparently contradictory claims for a "psychic energy field" that he or she was borrowing from to perform various acts, skeptics would no doubt meet such claims with derisive howls of disbelief. Yet, I am in the position of taking the testimony of various physicists and their interpreters on faith. The only apparent way I have of evaluating their claims without years of study is to see who is supporting whom. Harold Puthoff has put down a foot in both camps, a heretical act for which he must be excommunicated.

I remain skeptical.

John Pollack
Omaha, Neb.

I read with great interest of the continuing pursuit of Zero-Point Energy by former Uri Geller groupie Harold Puthoff. At the end of the article, Martin Gardner notes that the science fiction author Arthur C. Clarke mentions an inertia space drive based on Z-PE in his novel *3001*. I do not know if this is conjecture based on Mr. Puthoff's dubious research or the legitimate research of others. However, it should be noted that this is not the first time Mr. Clarke mentions a Z-PE-based space drive in his work. In his 1986 novel *The Songs of Distant Earth*, the colonizing ship Magellan is powered by a "quantum drive" or "vacuum energy drive," and in the acknowledgements he mentions scientific papers dating back to 1969 as the basis of the drive mechanism. Later, the author goes on to dwell on the physics of superspace and quantum gravity to explain the nature of the space drive.

Christopher T. Pearson
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Martin Gardner describes the coverage of the Zero-Point Energy research and more importantly its researcher, Harold Puthoff. The fact that some scientists and researchers believe in the feasibility of fringe science is understandable; it's a long shot, yes, but still possible. What is not forgivable, however, is the fact that some of these fringe scientists are portrayed in the media as the mainstream of science. . . .

Brian Peoples
Student
Arizona State University

Martin Gardner's essay "Zero-Point Energy and Harold Puthoff," does a considerable service in identifying nonsense that, until now, had escaped my attention, and probably that of most of my colleagues. That service is one I have come to expect from Mr. Gardner, who is nothing if not thorough in

his investigation of such things.

At the risk, however, of exposing my weak and perhaps misapprehended understanding of physics, I am struck by the analogy between the Zero-Point Energy Mr. Gardner describes, and the conundrum known as Maxwell's Demon, the theoretical chink in the armor of the Laws of Thermodynamics: Maxwell, you will remember, sought to illustrate, humorously, that energy might be "created," or at least sequestered such that work might thereby be accomplished, if moving molecules could be sorted according to their speeds, i.e., their kinetic energy, and if the sorting process itself could take place without expenditure of energy, or at least with less input than the energy obtained through sequestering. This result would, of course, falsify conservation of energy. Most of us in engineering believe—one might say, irrationally—that the process Maxwell conjectured is impossible, although I know of no accepted formal proof. Maxwell probably thought so too, and was simply throwing down a gauntlet to stimulate others to attack the problem. Notwithstanding this general belief, I know of one perpetual motion engine submitted to my employer about thirty years ago, which appeared to evade the Law through a similar mechanism; and *Nature* itself ran an advertisement, some twenty-five years ago, seeking funding and personnel for an Australia-based oceanic project which clearly rested on the same foundations.

Am I in error in concluding that Z-PE is once again relying on the fabled Demon?

James R. Fancher
Napenville, Ill.

(See also Harold Puthoff's response to Martin Gardner's column on zero-point energy and Gardner's reply, in the Follow-Up section, this issue, pp. 60–62.)

Robert Goddard and Roswell

None of the articles about Roswell, New Mexico, in the May/June 1998 issue mentioned an interesting, although perhaps irrelevant background fact about the area. American rocket pioneer Dr. Robert H. Goddard performed his experiments with liquid-fueled rockets nearby in the early 1930s.

His headquarters were on the Mescalero Ranch, about three miles from Roswell. The launching tower for the experiments was installed in the open desert, about fifteen miles from Roswell. It would be interesting to find out how close this location might have been to the more publicized later events in the area.

Perry F. Crabill, Jr.
Winchester, Va.

Why MPD So Popular?

Perhaps one reason Multiple Personality Disorder (May/June 1998) has become such a popular illness is that it seems an ultimate way of "having it all."

Denise Noe
Atlanta, Ga.

Prevalence of Nonsensical Beliefs

Thank you for including the very excellent insight provided by Robert Bartholomew ("Before Roswell") in the May/June 1998 issue. Looking to the past as a means of better understanding the present is, indeed, a most reasonable and productive approach.

Just this last week, I was giving a talk titled "A Critical Look At The Bizarre Beyond" during which I attempted to provide more logical (though decidedly less sensational) explanations for many of the so-called mysteries that people today hold dear. In referring to the various Bermuda Triangle myths, I mentioned a popular book written by a research librarian [Larry Kusche] and made it clear that—with their ready access to original source documents—this group should be called upon far more often to shed light on otherwise extraordinary claims. In this case, a boat that was reported to have vanished on a calm, clear day was shown to have probably met a much more natural demise when a review of the weather report in that day's *Miami Herald* indicated a hurricane was then passing through the area!

As a psychologist and former university professor, I am appalled by the prevalence of nonsensical beliefs encouraged by the media and supported by various vested interest groups. When giving my "What You Think You Know May Not Be So" talk, I frequently come close to being physically attacked by individuals who fervently believe in such things as the Church's Shroud of Turin or the United States' "War on Drugs." Alas, I sometimes think that perhaps as much as half of what the man in the street believes to be absolutely true is, in fact, absolutely false.

But I must wonder: Is this also the case with readers of *SI*? While they may smile at tales of crop circles and remote viewing, are they as truly open minded when it comes to questions involving heterosexual AIDS, the hazards of second-hand smoke, the value of automobile air bags and the efficacy of psychological counseling?

Stephen B. Mason
Monarch Beach, Calif.

TV Science Shows Can Debunk

I am writing in response to your May/June issue. In his Psychic Vibrations column, Mr. Sheaffer mentions the Arizona UFO flap. This is again mentioned in the Articles of Note section (p.56), in the review of an article in the *Phoenix Times*. I just wanted to inform you that a show that aired on The Learning Channel analyzed the film of the lights disappearing one by one. A film crew found a similar vantage point during the day and filmed the area during the day. They then proceeded to superimpose the film of the lights on top of the film shot during the day. The lights are shown to "disappear" as they descend behind the mountain range in the background. The analysis clearly shows that the lights were flares dropped by parachute and descending to the ground behind the mountains. This brings me to my second point. That some of the science shows on TLC and/or The Discovery Channel can be educational as long as the observer wants to know the truth.

Last week, two days after buying your magazine, I saw Susan Blackmore on a TLC show that spent one hour dispelling the claims of several psychic and psychic manipulators as frauds and experts at cold reading I was stunned since I had just read Ian C. Maione's ["Testing *Put to the Test*"] and Susan Blackmore's ["Abduction by Aliens or Sleep Paralysis?"] article the day before. Clearly some of the shows have a bias, but not all are garbage. I would suspect that Mr. Maione could and should like to also note that TLC did a good job of exposing these cons.

Finally, thank you for a great magazine. It is the balance that I use to avoid getting swept into the misinformation flood; as I

am someone who wants to believe but does not want to be conned.

Alberto Macin, Jr.
Lake Bluff, Ill.

Emphasize Importance of Objectivity

I have two suggestions for reader Dale Kirksey, who asks how person can teach science without alienating people taught by churches to be suspicious of science (Letters, May/June 1998).

First, stress the importance of objectivity. Pursued objectively, science does not attack religious beliefs; it is only perceived to do so by those whose beliefs happen to be undermined by the findings. Then, any debate takes place on scientific grounds, and attempts to refute supporting evidence make fundamentalists look very bad, especially after general knowledge has caught up.

Second, draw attention to what the scientific revolution was revolting against, namely the reliance on authority. In advocating reason and observation in the place of authority, there is no need to mention religion, since medieval scientists were just as guilty as religious leaders of accepting authority unquestioningly.

The best example is Aristotle himself, who decreed that the sun traveled around the earth. Ancient astronomers such as Aristarchus had good reason to believe otherwise, but the towering authority of Aristotle pervailed and slowed progress in the field for 1,800 years.

Science teachers cannot expect to convert fundamentalists, and their teachings should not be sullied by religious beliefs. This is science class, in which observations point to patterns, patterns to hypotheses, and hypotheses to theories. Pursuance of objectivity and rejection of blind acceptance of authority may just inspire some students to independent thought.

Don Keith
Waterloo, Ontario

DHMO Hazards a Drop in the Ocean

I was surprised at some of the one-sided, knee-jerk correspondence (Letters, May/June 1998) in your otherwise excellent magazine regarding Dihydrogen Monoxide (DHMO) and I would like, in the interest of balance, to present the counter-arguments:

1. DHMO is a natural product and can be found in large amounts in certain places on the earth's surface
2. Provided sensible precautions are taken, many of the hazardous effects you note can be minimized
3. Many organisms require DHMO as a vital part of their biochemistry and some species have even evolved to live in its liquid form
4. It can be used as a topical coolant and even as a fire-retardant
5. Its use as a solvent is unparalleled. I have personally found it useful in removing biological stains, waste, and odours
6. Doctors recommend co-ingesting 100ml of DHMO with pharmacological preparations in order to reduce antidotal-unpalatability and pharmaco-pharyngeal adhesion
7. The UN has officially approved its use as the most effective prevention and cure for dehydration in the third world

DHMO has been blamed for everything from spontaneous noncombustion to the sinking of the *Titanic* and we need to keep our reactions to it rational. The potential hazards should be seen as a drop in the ocean compared to the benefits of its use.

Les Cross
Aylesbury
Buckinghamshire, U.K.

Whole Lot of Kidding Going On

Re: the review of Tony Ortega's article "The Hack and the Quack" (Articles of Note, May/June 1998)—

As a physicist/engineer who has worked in both spectrochemistry and television systems, I can say with confidence that "spectral analysis" of videotape is meaningless. All that videotape color can record is the relative luminance in three broad color bands (the "primary colors" used in the system). It does not reproduce line structure such as would be required to analyze luminous sources.

This Jim Dilettoso is either kidding himself of trying to kid the public.

Charles Chandler
Lexington, Mass.

Hitler, Sex, and Irony

Ralph Estling's column "Gimme That Ol'-time Logical Consistency" (May/June 1998) credits Adolf Hitler with having an "exemplary sex life." By whose standards? On Sept. 18, 1931, Hitler murdered his neice, Geli Raubal, with whom he'd had an incestuous relationship that began in her teen years. One successful blackmail attempt on Hitler involved a folio of pornographic drawings of Geli by her Uncle Adolf. Later in the 1930s, three women committed suicide after being exposed to Hitler's unbelievably perverted sex rituals . . . .

Mr. Frazier, I've read and saved every issue of first, *The Zetetic* and now *Skeptical Inquirer* since Fall/Winter 1976. I've had not a quibble till now.

Arthur Finger
Victoria, B.C., Canada

Ralph Estling responds that in his references to Hitler's "exemplary" sex life he was being ironic.

—Editor

'Vulcan' Was Roddenberry's Creation

I don't wish to belabor the mythical origins of a fictitious character, but Dennis Feucht's letter in the May/June issue of *SI* gave me a giggle.

During my seventeen-year association with *Star Trek*'s creator, Gene Roddenberry, as his executive assistant, we often received mail from people with wild theories about how this or that came about. And with all due respect to the good city fathers of Vulcan, Alberta—this is revisionist history at its best!

At any rate, let me set the record straight. I know for a fact that the choice of the name planet Vulcan was a construct of Gene's fertile mind, based upon what, I know not. But I do know this—it was not named after the home town of Leonard Nimoy, the actor playing Mr. Spock. Nimoy is a Boston native.

Set a course for Beantown, Mr. Sulu. Warp factor five!

Susan Sackett
Scottsdale, Ariz.

Reader Dennis Feucht reports reading that the planet name "Vulcan" in *Star Trek* was

an on-set creation taken from the name of Leonard Nimoy's Canadian hometown.

There are several problems with this theory.

1. Leonard Nimoy is American, not Canadian. He was born in Boston.
2. While there is a town named Vulcan in Alberta (population 1,466), Leonard Nimoy has never lived there.
3. The name "Vulcan" (and a variation, "Vulcanis") can be found in Gene Rodenberry's early development notes for the original series pilot, which were written long before Leonard Nimoy was cast as Mr. Spock.

Lately, the Canadian town named Vulcan has been pushing the *Star Trek* connection hard to promote tourism. But rest assured that the connection is an accidental one of name only.

Connor Cochran
Toluca Lake, Calif.

Screenwriter, Astrophysicist, and *Contact*

Having followed with surprise and chagrin the enlightening, amusing and endless panoply of letters (July/August 1998 and March/April 1998) about my essay on aliens and scientists in *Men in Black* and *Contact* (November/December 1997), I am stirred to reply, and what better way to resolve a number of issues (especially the one regarding the "time dilation" phenomena shown in *Contact*) without idle speculation than to inquire of those who are directly responsible.

Michael Goldenberg, co-author of the *Contact* screenplay, was kind enough to reply to my questions about his intentions and the scientific basis for the "time dilation."

> It's been a while, and I'm afraid I don't really recall the exact technical explanation. In both the screenplay and the novel Ellie is found to have been absent for only moments from our perspective, while her subjective experience lasts much longer (I chose, somewhat arbitrarily, eighteen hours; I'm not sure the novel ever specifies how long she's gone). The novel also brings up the matter of the blank tape, but the *duration* of the static is never discussed.
>
> In both cases, though, the story point came first. The dramatic idea that the "Caretakers" send Ellie back with no absolute proof of their existence (presumably for moral or practical reasons; e.g. we're not ready yet, they're gradually conditioning us, etc.) and Ellie's subsequent "hoisting on her own petard" was decided on for reasons of plot and theme. In general, I think it was assumed that any civilization with technology advanced enough to build a stable, artificial wormhole would be able to manipulate relativity in any number of interesting ways. (In the novel, when the father/alien tells Ellie it's time for her to go home, he mentions something about the need to "engineer a consistent causality.") I know when Carl was writing the book he discussed the matter of wormhole physics with Kip Thorne at Cal Tech. I spoke with Kip about this as well, but again, don't remember the specifics (and to be honest, it probably went right over my head). He'd be the one to ask for a more technical explanation. But in any case, it was the needs of the story that came first; the physics followed after.
>
> Hope this helps.
>
> Michael Goldenberg

Following Mr. Goldenberg's suggestion, I contacted Kip S. Thorne, Richard P. Feynman Professor of Theoretical Physics (Theoretical Astrophysics) at California Institute of Technology especially regarding my much-disputed assertion that the observed phenomena in the motion picture fell under general relativity. He was kind enough to reply in two brief notes combined below:

> You were correct, that the time effects in *Contact* are general relativistic (not special relativistic). The wormhole entails a large curvature of spacetime, so general relativity is the venue.
>
> I don't know a reference that discusses this particular case. Quite generally, the amount of flow of time, in curved spacetime, can be very different for different observers moving through spacetime along different trajectories—and the nature of the differences depends on the nature of the spacetime curvature. For a very general discussion, see my book *Back Holes and Time Warps.*

Let me add that despite the misgivings of many readers, I did, in fact, enjoy *Men in Black* (saw it three times!) and thoroughly appreciated its humor. My point throughout, despite a tongue-in-cheek tone, was to compare the general perception of aliens and scientists and to contrast the view that is most entertaining and pervasive in our society (*MIB*), with that which is undoubtedly more realistic, poignant and ultimately, in my view, important (*Contact*). It is truly a challenge to combine both, and as Mr. Goldenberg observed, his intention was to tell a story and create drama: An even better reason to admire the extraordinary results of his and Mr. Zemeckis's fine effort despite its failure to generate the same box-office dollars as *MIB.*

Edward Summer
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The letters column is a forum for views on the matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters, not all can be published. They should be double-spaced. Address: Letters to the Editor, SKEPTICAL INQUIRER, 944 Deer Dr. NE, Albuquerque, NM 87122.

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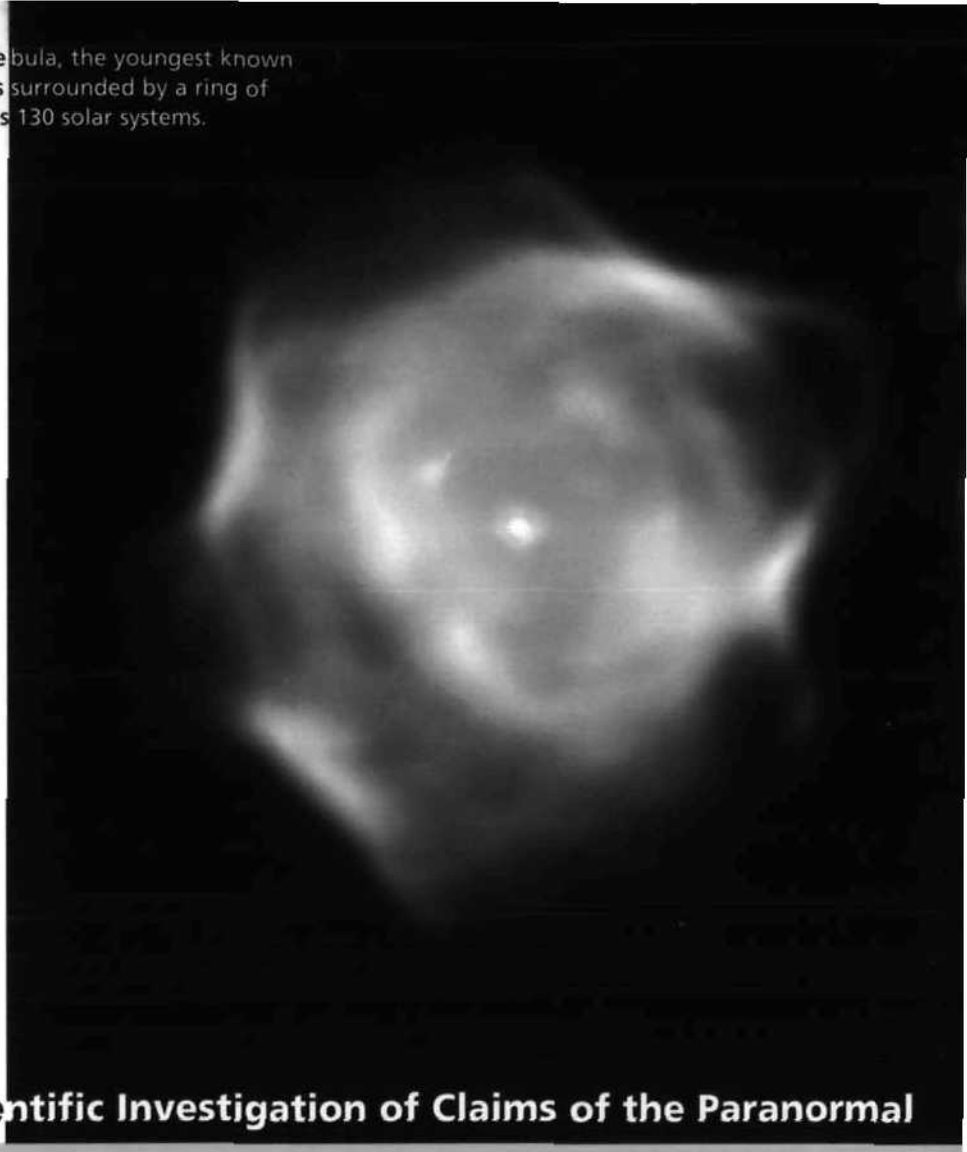

This image shows the infancy of the Stingray Nebula, the youngest known planetary nebula. The bright star in the center is surrounded by a ring of gas, seen here in green. The Nebula is as large as 130 solar systems. (M.Bobrowsky and NASA)

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The Committee for the Scientific Investigation of Claims of the Paranormal

The Committee for the Scientific Investigation of Claims of the Paranormal encourages the critical investigation of paranormal and fringe-science claims from a responsible, scientific point of view and disseminates factual information about the results of such inquiries to the scientific community, the media, and the public. It also promotes science and scientific inquiry, critical thinking, science education, and the use of reason in examining important issues. To carry out these objectives the Committee:

- Sponsors publications
- Conducts public outreach efforts
- Maintains an international network of people and groups interested in critically examining paranormal, fringe-science, and other claims, and in contributing to consumer education
- Encourages research by objective and impartial inquiry in areas where it is needed
- Convenes conferences and meetings
- Conducts educational programs at all age levels
- Does not reject claims on a priori grounds, antecedent to inquiry, but examines them objectively and carefully

The Committee is a nonprofit scientific and educational organization.
The SKEPTICAL INQUIRER is its official journal.

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